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MITTERRAND COMMENTS ON ARIANE, EUROPEAN SPACE PLANS

Paris LE MONDE in French 2 May 87 p 8

[Article by Maurice Arvonny and Jean-Francois Augereau: "The 25th Anniversary of CNES: In Mr Mitterrand's Opinion, For Ariane-5 'We Must Not Limit Time Spent on Development'"]

[Text] The National Space Studies Center (CNES) lavishly celebrated its 25th anniversary on Wednesday, 29 April, by inaugurating, in the presence of the president of France, the new international conference center at the City of Science and Industry in la Villette. Although the largest part was dedicated to past history, to paying tribute to the pioneers, to the part France and Europe have played in the conquest of space, the celebration was dedicated to the future. In fact, the hesitancy and learning of the first years have been replaced by the maturity of Europe on the verge of making decisions and commitments for the next 25 years.

"The European space industry is now in a transition period," Mr Frederic d'Allest, director-general of CNES, remarked recently. Next November, at a large space conference, the ministers of the European member countries of the European Space Agency (ESA) must, in fact, come to a decision on their firm commitment to three ambitious programs: the Ariane-5 heavy launcher, the manned Columbus module, and the Hermes spaceplane. The role Europe will play in cooperating with the large countries will depend on their decisions and their political motivations.

Mr Jorg Feustel-Buechl, director of space transport systems of ESA, hopes they will be successful, indicating jokingly that he hoped to speak at the 50th anniversary of CNES. Because these decisions will undoubtedly change "the face of the world," Mr Mitterrand emphasized in his speech, and the decisions of these pioneers who for 25 years have presided over the destinies of French and European space "have already started to change it." However, the time for doubts and trial and error is over, and the first of the strategies is now that "France and Europe must have a reliable launcher to fulfill our needs."

This reference to the disturbing situation currently facing Europe, that the Ariane-3 launcher has been on the ground for the past 11 months following the failure of its third-stage motor, was a warning. This situation, which

is now barely acceptable, will become unacceptable in the future when it will be necessary to regularly place operational satellites, automated laboratories or workshops, and manned vehicles into orbit. For this reason, Mr Mitterrand vigorously encouraged the constructors of the Ariane-5 to "not try to limit development time, because we will ultimately pay the price with costly delays." "The requirement for quality is also essential for the launcher, because its availability affects all the other projects. The great strength of the European program," he added, "is the launcher, which was available at an opportune time and was able to respond to the demands of the market."

The president also emphasized the need for an "overall balance between scientific programs and application programs on the one hand, and those revolving around manned flights on the other hand." "Progress in robotics" has reduced the importance of man in space. However, humans are still essential, emphasized Mr Mitterrand, as he pointed out that he had spoken in favor of a European space station at the February 1984 conference at the Hague. Then Mr Madelin, Minister for Industry, announced that an in-depth study of a European automated manned module, Pallas, will be undertaken in 1987.

Mr Mitterrand then emphasized "the importance of our space program for our defense," considering that "the recently launched programs have not exhausted ideas on the subject." Mr Andre Giraud, minister for defense, appeared to be of the same opinion. His report emphasized the fact that military space and civilian space are inseparable, pointing out that the first French satellite was launched by a rocket which depended to a large extent on military studies. On the other hand, the recently approved military telecommunications (Syracuse-2), earth observation, and electronic location (Helios) programs are derived from the civilian Telecom-1 and Spot programs.

Mr Giraud discussed the "challenges of the future," from technological as well as economic points of view." He said, "We must first determine the challenges of the future with Europeans, then with our allies, and with the entire world as a function of the prospect for peace." However, "we must have our own strategy" and not "copy what others have done in space sector," whether they be "military or civilian."

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ESTABLISHMENT OF FRG SPACE AGENCY LIKELY SOON

Duesseldorf VDI NACHRICHTEN in German 20 Mar 87 p 1

[Article by Wolfgang Pester: "Space Travel Agency Seeks Initiators"]

[Text] Establishment of a German space travel agency in the next two years appears increasingly more likely. Now, Minister of Foreign Affairs Hans-Dietrich Genscher is also among the supporters. At the First German Economic Congress in Cologne last week he stated that Europe's target of autonomy in civilian space travel is closely tied to an active German space travel policy which does not respond and react to proposals made by others. A national agency will be necessary which plans, coordinates and implements all space travel activities.

The problems of the future space policy did not have the same priority in coalition negotiations as they did at the First Economic Congress in Cologne whose topic was "World Space as a Market--Civilian Use of the Universe." Thus, it was not surprising that, just like Genscher, SPD research expert Josef Vosen called for reorganization of the fragmented areas of responsibility in space travel, and criticized coalition negotiations and pointed to the fact that the Federal government must put an end to the confusion in the space policy by means of clear decisions.

Thus, the initial situation for establishing a German space travel agency appears favorable. The Union fraction has been in favor of it for a long time, especially the CSU which does not yet seem to have given up hope for the site of a high-tech agency in Bavaria--even following the expansion of the German Research and Development Institute for Air and Space Travel (DFVLR) in Cologne and not in Oberpfaffenhofen.

A study by the Industrial Plants Operating Co (IABG), which was presented to the Ministry for Research and Technology (BMFT) at the beginning of February, also provides the Federal government with political backing. At the request of the BMFT the authors looked for more efficient structures and from the five different models presented favored the one calling for establishing a German space travel agency.

According to Genscher's statements, the importance for the FRG of a new organizational structure in space travel must be linked with the importance of the FRG in the EC. The goal of space travel autonomy for Europe can only be achieved if the FRG, economically the strongest country in Europe, makes its full contribution to this task--financially and in terms of technology. In the long-term policy and in the consciousness of the public, space travel must be given the priority which is its due for securing its own future and that of Europe.

The desired goal of autonomy in European space travel is by no means self-sufficiency. Simply put, the 20 years of cooperation with the United States should be further developed from a junior partnership into one having equal rights.

At the economic congress in Cologne BDI [Federation of German Industries] president Tyll Necker said that in the space policy there is no alternative to commitment for the FRG. In this, the search for new materials, for example, research under conditions of weightlessness, is of particularly strategic importance.

Professor Reimar Luest, general director of the European Space Agency (ESA), told congress participants from politics, industry and research that by the turn of the century Europe should have moved to the point of being able to utilize all opportunities in space--both manned and unmanned. An orbital infrastructure is absolutely essential for this. For Luest, the most important elements for this are the more efficient launch vehicle Ariane 5, the Hermes manned spacecraft, partnership in an international space station and a data relay satellite system.

The cost will be several times greater than to date. The FRG alone in the next 25 years has invested barely DM15 billion for space research. According to Necker, this amount will double in the next 25 years. Yet even then, with its civilian space travel Europe will not have closed ranks with the United States, which is investing five times as much today.

12124
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FRG-USSR SPACE COLLABORATION, PROJECTS

Duesseldorf VDI NACHRICHTEN in German 27 Mar 87 p 39

[Article by Susanne Paech: "A 'Hexe' Is Working for X-Ray Astronomy"]

[Text] When in 1982 the USSR offered the German Max Planck Society cooperation in X-ray astronomy, the Space Shuttle was still on a fully successful course. What at the time appeared to be a "small solution" now turns out to be a test by the Soviets to enter the international business of satellite launches with their "workhorse," the proton rocket. For the FRG, too, the "emergency" is being rehearsed with this cooperation; there is hope that in the next few weeks the launch of the "Hexe" [high-energy X-ray experiment] will provide first information about the question of whether the USSR, after concluding the German-Russian research agreement last year, can be viewed as a reliable partner in the space travel business.

The space travel project, which was decided on at that time, in the area of X-ray astronomy was planned with limited means and evolved primarily because of the initiative of prominent researchers who went beyond the Iron Curtain in combining common scientific interests.

The person who initiated the undertaking was Professor R. Z. Sagdeyev, member of the Russian Academy of Sciences, who, as a member from outside the Max Planck Institute for Extraterrestrial Research (MPE) together with Professor Sunyayey offered his German colleague Professor J. Truemper the joint flight of a scientific payload for the Zalyut space station. Truemper, who up till then had done his X-ray research primarily with stratospheric balloons, suggested developing a satellite experiment using a balloon payload put together by the MPE and the Institute of Astronomy of the University of Tuebingen (AIT); the two German institutes have been carrying on joint research in balloon-based X-ray astronomy for more than 10 years. By way of contrast, the Soviet Union obligated itself to undertake adapting the payload to its own rocket as well as launching and docking with the space station on a zero tariff basis.

While the FRG government does, of course, tolerate this project and the Ministry for Research and Technology [BMFT] rejected any special project-based financing, the ESA [European Space Agency], Great Britain and the Netherlands joined in the project with two additional scientific payloads from the X-ray astronomy sector. The BMFT's refusal caused the MPE and AIT to come up with yll the necessary funds from their own budgets.

Total Costs of the Satellite Version Are About DM2 Million

The Hexe version of the satellite, whose total costs are in the area of only DM2 million, was developed in cooperation with Messerschmitt-Boelkow-Blohm. Whether because of the low budget available all systems do in fact fulfill the expectations placed on them can only be answered after a successful launch and starting all the equipment. But it does not make any difference whether the Hexe operates in a troublefree manner or not: in any case this project will make it possible to acquire useful information for further cooperation with the USSR.

The mission which was originally planned for Salyut was shifted in the meantime to the new Russian space station Mir which was launched into space last year and was once again manned in the beginning of February. In addition to the German experiment, in the meantime two European and one Russian experiment were also integrated into the 20-ton Module A; it is to dock in the next few weeks with the space station and then remain in space as a permanent part of Mir. All together, the payload covers the entire high-energy spectrum from soft X-ray radiation to gamma radiation.

Of course, cooperation with the Soviets is subject to special laws; Dr C. Reppin of the MPE, who as project leader of the Hexe traveled many times to the Moscow Institute for Space Research Iki, responded to the question which is often asked when comparing Eastern and Western space travel technology by saying: "In my opinion, Russian space travel is operating technologically with simpler means; extremely costly electronics and high-technology materials are avoided. Overall, development in the USSR proceeds more conservatively. In contrast, we tend to exaggerate things somewhat. We are personal examples of this. We are constantly driven by newfangled electronic components, we always want to be at the latest level of development; that naturally raises the risk."

The first rough assessment of the data is being done in the Moscow control center. A Hewlett-Packard computer was taken to the USSR for this purpose. What is the situation in the East in respect to the delicate topic of electronics transfer? Reppin, with a rather significant expression says that "we naturally need an export license for the ancient computer," and he puts particular emphasis on the work "ancient." Regulations and prohibitions...on the positive side it can be noted that there is nevertheless always room for international research.

Cooperation produces advantages for both sides: The Soviet partners got an idea of the structure and test equipment of the payload for measuring X-ray radiation. Their research can also profit from the agreed-upon exchange of the measuring data obtained. Reppin went on to explain that "in addition to exploring the inner planet system, Russian space travel research also seems to be focusing on astrophysics."

On the other hand, for the Europeans a joint flight is a unique opportunity to further pursue X-ray astronomy in space after Exosat, the last functioning X-ray satellite, ceased operating in 1986 and the launch of successor satellites was postponed for a long time. The Mir experiment in space will surely contribute to solidifying their leading international role in the area of high-energy astronomy.

Is the Proton Rocket an Alternative to Mothballing Rosat?

In the meantime the project is raising another prospect which goes far beyond that. People are secrerly whispering about whether the proton rocket would perhaps offer an alternative worth discussing to mothballing Rosat--the X-ray satellite which was built under the leadership of the MPE and which is as good as completed, but whose launch has been postponed for years because of the Shuttle catastrophe.

Whether in the future the Soviet Union can in fact break into the competition of the internationally competitive satellite launching business depends less on the technical power of its rockets and more on the extent to which its political system permits a mode of implementation which is in keeping with international practices. Thus, even in the case of Module A there are the familiar difficulties in respect to learning the exact launch date. At present Moscow is also keeping the exact data about Proton under lock and key--yet disclosure of the parameters is an absolute prerequisite for commercial suppliers.

If real actions are to follow on the often stated intentions to open Soviet space travel to economic sectors and if the USSR intends to offer a genuine alternative, a process of rethinking is mandatory here. Because of the desperate situation with the Shuttle, conditions have never been as good as they are now for pressing forward in this matter. It can be assumed that the Soviet Union recognizes these signs of the times and knows how to use them.

12124
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FRG CONFERENCE ON CIVILIAN USE OF SPACE

Duesseldorf VDI NACHRICHTEN in German 27 Mar 87 p 40

[Article by Wolfgang Engelhardt: "Outer Space Between Market and Factory"]

[Text] Predictions of a positive reassessment of commercially interesting utilization of satellite programs, predominated at a meeting of experts which was organized by students at the University of Cologne on March 10-11. Politicians, managers and engineers probed the opportunities of space travel to improve living conditions on our planet. All aspects of civilian use of geostationary orbiting for research, application and production were discussed, but the scope of future astronautical projects and above all the date of their being realized were variously judged.

For two days almost all sectors of space travel were addressed in a well-planned program of lectures; leading experts in the respective disciplines reported on the scientific, technical, economic, political and social aspects of man's venturing into cosmic dimensions. During numerous panel discussions and so-called workshops there was opportunity for extensive discussion of the plenary lectures between those reporting and at least 700 young and older, authoritative and less informed listeners. Many discussions between advocates and opponents of space travel, between industrialists and students of philosophy, for example, took a controversial turn.

In his opening address on the topic "European Space Travel Autonomy," Minister of Foreign Affairs Genscher established an important political focus for the congress with his call for a better German space travel organization, whereas Minister of Research Riesenhuber had, of course, assumed sponsorship, but did not come personally to Cologne and did not even send a deputy. Perhaps in this way external appearances reveal something about programmatic motives. Professor Reimar Luest, general director of the European Space Agency (ESA) explained the necessity for and usefulness of technological cooperation for further political unification of the European countries involved. By presenting diverse satellite programs for radio-engineering communication or weather and earth observation Luest gave some concrete examples of the level of economic use of space travel projects which has been achieved.

The chairman of the board of the German Research and Development Institute for Air and Space Travel (DFVLR), Professor Walter Kroell, who just recently assumed office, called to mind the special requirements of space travel and the unrelenting demands of scientists to set new goals in the frontier of technical possibilities and thus to give business new stimuli. Kroell elaborated, saying that "a change from the state taking the risk to private-enterprise commitment is beginning to take shape and in the future German industry should invest even more where the spadework has been done in order not to forfeit technical-scientific shares in international competition.

In the opinion of Tyll Necker, president of the Industrial Association of German Industry, there is no alternative to comprehensive use of new technologies for such a highly developed industrial country like the FRG. "Involvement in space travel appears indispensable, even for economic and political reasons." In Necker's opinion astronautics at present is in a situation similar to that of air travel at the beginning of this century, that is, just at the beginning of industrial use. "Thus, it is most important that we should not make our commitment to space travel dependent on whether associated relatively high costs are amortized in a short time!"

Ralf-Peter Thuerbach of the Kienbaum management consulting firm focused on the conditions for commercial use of astronautical technology. Kienbaum put into words the list of questions which must be answered prior to any commitment to space by a company: "Who are the parties interested in space products? What kind of output are we dealing with? How does the market look right now and in what direction will it develop? To what extent does the space product differ from the corresponding earth products?" Thuerbach, who is a member of the board of the cooperative space marketing company Intospace, is at the moment particularly involved in attracting industrial customers for technical-scientific experiments in space which perhaps later might result in commercially interesting applications. As a short-term goal Intospace first wants to increase the share of industrial experiments for the second D2 spacelab space flight which has been planned.

Manfred Kuebler of the Dornier System explained how today satellite technology in subsectors brings in and helps save a lot more money than what the total cost of the satellites together with their electronic payload and corresponding launch rockets is. Information transmission via a communications satellite with its billion dollar sales is for the moment the real moving force in Western civilian space travel.

In Kuebler's opinion exploration of the earth is becoming the second sector of application of space travel with direct commercial usefulness. With special sensors weather or earth exploration satellites are able to scan the earth's surface in various spectral regions and follow the movement of clouds in the atmosphere or observe agricultural areas for degree of maturity, pest infestation and harvest productivity. Even the discovery of new mineral resources in geologically interesting zones or early warning of icebergs in polar waters is possible with such satellites, even at night and under cloudy conditions if equipped with efficient radar sensors. Kuebler added that "cooperative marketing of American Landsat and French Spot display data has in

the meantime been fully established, and soon the companies involved will move into the profit zone even without state support."

Paul Robert Wagner of the Gerlin conglomerate dealt with the tricky topic of "risks in space and insuring them." This sector of insurance, which originally appeared tempting, completely collapsed after the serious aborted rocket launches last year. After the Shuttle accident and the Titan, Centaur and Delta crashes and after several Ariane failures, insurance companies in the United States and Europe had to suffer bitter losses so that for the present space flight launches are no longer being insured. Not until some time in the distant future does Wagner see any definite opportunities for insuring satellite launches. "The insurers, as merchants, will make capacity available as soon as the industry has competently proven increased safety in the launch vehicles and allows premiums which offer a possibility for profit."

Space Organization Within the UN Was Proposed

At the Cologne congress the lecture by Georgiy Uzbenskiy, a senior manager and engineer at Glavkozmoz, the Russian space travel organization in Moscow, also generated substantial interest. Speaking about peaceful and commercial use of space, he renewed the USSR's offer to make Soyuz or Proton launch rockets available to launch Western research and application satellites. There was also applause for Uzbenskiy when he repeated the recommendation of his party leadership to establish an international space organization in the context of the UN.

Professor Jesco von Puttkamer, a leading German-American engineer who with Wernher von Braun had built the Saturn rockets for the Apollo moon landings and today is responsible at NASA for future planning, ventured a visonary look into the distant future of mankind and its perhaps very natural and close relationship with space travel. He sketched an absolutely adventurous space scenario with human culture developing in the expanses of the universe. Of course, von Puttkamer was not able to give any concrete data as to when and how this goal might be realized politically, socially or financially, but this did not detract from his optimism: "A great task for our generation could be landing human beings on the planet Mars, such an international mission, above all, if realized together with the Russians, could be a potential "substitute for war" and become one of the most important elements in the history of mankind

In von Puttkamer's remarks and especially later during his workshop discussion which was very well attended, the discrepancy between the bold space plans for tomorrow and the desperate situation in which both American and European space travel finds itself at present became clear: "After the shock of the Challenger accident we must now painstakingly extricate ourselves from our depression and perhaps even include such serious setbacks in our future plans."

In spite of everything, this futurist researcher remains firm in his conviction that in 10 years at the latest the international space station, which NASA plans to build with European, Japanese and Canadian help, will be orbiting the earth. Then production of new exotic materials in weightlessless

will also be possible which cannot be produced on the earth's surface. Then, in von Puttkamer's opinion, space will also emerge as a commercially interesting market with figures in black in the balance sheets of the business concerns which today are preparing for this with appropriate studies and experiments.

12124
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FRG DORNIER CHIEF ON PARTNER SEARCH, INVESTING, DAIMLER-BENZ

Duesseldorf HANDELSBLATT in German 12 May 87 p 13

[Text] Munich, 11 May (GW)--"At the Dornier Group, Friedrichshafen/Munich, the consolidation phase has set in one year earlier and at something of a lower level than we expected," according to Chairman of the Board Dr Eng Johann Schaeffler. The board of directors measured a growth in sales of 18 percent at DM 2.5 billion, although with a volume of business of DM 2.123 billion (compared to DM 2.118 billion in 1985), the Daimler-Benz subsidiary achieved only around the same level as the preceding year.

The profit situation thus worsened by around 20 percent, finance chief Dr Karl-Wilhelm Schaefer affirmed. Around DM 200 million in sales was lost through the departure of Dornier Gesellschaft mbH in Lindau, which could not be balanced out by growth in the business volume of medical technology to DM 576 (was 489) million. Because of the switch in the majority from the Dornier family to Daimler last year, taxes in 1985 inflated irregularly to DM 235 million. This year, taxes dependent on earnings thus dropped considerably to DM 169.7 million.

So despite the worsening in earnings, a higher yearly gain of DM 42.4 (1985: 33.1) million is reported. In addition, three times the amount of extra earnings was reflected in the results compared to the previous year, not least of all because restrictions on adjustments through the settlement of orders were lifted. The negative effect of the decline of the dollar on sales and earnings amounted to around DM 20 million.

In the current year, the influence of fluctuations in currency will probably become greater, so that Schaefer expects another decline in earnings of around 15 percent. The sales figure in 1987 will probably drop to DM 1.9 billion, while output should remain around DM 2 to 2.1 billion. This consolidation phase will come to a halt in the years ahead, meaning that the Dornier Group will continue to operate around the DM 2 billion sales mark.

Nevertheless, Dornier chief Schaeffler announced a sharp increase in the investment pace for 1987 and 1988, at over DM 150 million each year. The drag in investments by the previously family-owned company in recent years can be eliminated with its new mother, Daimler: "We now have the opportunity to invest adequately and set our sights on longer-term goals," Schaeffler said.

The focal points for this are the modernization of airplane production at the Munich and Oberpfaffenhofen plants, for which DM 160 million is to be spent. Investments in Friedrichshafen are a little higher, at DM 170 million, the biggest project being the construction of a new electronics center. "We are not looking towards expansion, we want to be better," is Schaeffler's justification for this rapid pace of investment.

After the number of employees increased in 1986, primarily at the Friedrichshafen plant, by nearly nine percent to 9,667, resulting in a sharp rise in personnel costs to DM 730 (1985: 645.5) million, the number of people employed at Munich/Oberpfaffenhofen will probably decline somewhat in the future, while slight growth will be recorded at Dornier System GmbH in Friedrichshafen.

Despite the diversity of its activities, the roots of the Dornier Group are still in aircraft construction and space travel. If the sales figures for 1986 were disappointing, then it was because, in contrast to the year before, only a few big orders were received in the area of space travel, while in the area of aviation the orders for combat effectiveness upgrading of the Alpha Jet and for the development of the Jaeger 90 have yet to arrive. But even incoming orders for Dornier's own Do 228 airplane program dropped off, so that only two instead of three airplanes are being produced each month.

Even though DM 723.9 (1985: 634.7) million, or 34 percent of the total sales of the Dornier Group, came from airplane construction and DM 187.3 (1985: 131.2) million, or 9 percent, came from airplane service, this increase can be attributed primarily to the delivery of eight Alpha Jets to Nigeria, in which Dornier functioned as chief contractor. Because of the high share in the order taken by subcontractors, output in airplane construction sank to DM 630.5 (1985: 670.9) million. This included settlement on 23 (1985: 20) Do 228s, which represents a plus of DM 20 million.

In the meantime, the definition phase for the new passenger airplane, the Do 328, began in April 1987. This is a 30-seat high-winged monoplane with turboprop engines. The first Do 328s (price class: $5 million) are scheduled to be delivered in the summer of 1992. The development costs are estimated at DM 500 million, and Schaeffler is hoping for a subsidy of 60 percent of this from the Federal Ministry for Economics. He estimates annual worldwide demand for shuttle planes of this type at 150 units, of which Dornier is aiming for a market share of 20 to 25 percent, so that the sale of around 400 Do 328s by the year 2005 is anticipated. Schaeffler is looking for a partner for the Do 328 who will have a 35 to 40 percent interest in the project.

Dornier's Own Airplane Program Has First Priority

Dornier hopes to make a big move with the Alpha Jet during the upcoming large-scale competitive bidding in India. With Claudius Dornier's "Seastar," the company is willing to provide neighborly assistance, such as in the construction of the prototype, but it is not interested in participating in the program and in its financing. On the firm's commitment to Airbus, the head of Dornier emphasized that the company's own airplane program has first priority. Cooperation in the Airbus program must thus be compatible with the

company's capacity, he said. Because of the large number of orders for the Airbus A320, however, greater involvement in meeting full working capacity is expected.

In the areas of space travel, new technologies and electronics, sales fell off by 55 percent to DM 195.2 (1985: 450.6) million, although the decline in output by 14 percent to DM 253 million was less dramatic. The focal points of activities in the years ahead are the Ariane 5 carrier rocket, the Rosat 2 X-ray research satellite, the Columbus project and the construction of the Hermes European space shuttle. In electronics, the company is pursuing the role of trend-setter in sensory analysis, he said. The first signs of synergetic effects with Daimler are being experienced in the areas of automobile electronics and materials, Schaeffler said.

Dornier registered a considerable amount of growth in military technology, where sales climbed up to DM 194 (1985: 140) million. In this sector, full preparations were initiated for intermediate-range reconnaissance drones. In naval technology, the development of the German-Danish sea-ground mine 80 was concluded. Sales in logistical maintenance, training and planning consultation fell off slightly to DM 210 (1985: 226) million, not least of all because there were no infrastructure projects from OPEC countries.

In the growth sector of medical technology, Dornier wants to continue its activities in shock wave technology. Last year, 93 kidney lithotripters were delivered, so that 204 of them were in service worldwide at the end of 1986. After an increase in sales of 18 percent, medical technology now constitutes 27 percent of total Dornier Group sales. In the meantime, a gallstone lithotripter has been developed in conjunction with the Munich-Grosshadern clinic, and has been used to treat 200 patients at the Munich and Wuppertal pilot facilities. However, since the equipment in the coming second generation of kidney lithotripters is clearly less expensive than those of the first generation, finance chief Dr Schaefer is figuring on a lower volume of business for 1987.

12271
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FRG: DFVLR PROPOSES NATIONAL SPACE AGENCY, PROGRAM

Duesseldorf HANDELSBLATT in German 6 May 87 p 15

[Text] Bonn, 5 May (DPA)--The federal government should set a course for future German developments in space by the end of fall; at stake are not only important projects costing billions of German marks, such as participation in a continually manned U.S. space station, but also an improvement in management in the area of space research and development.

This was the position adopted in a set of proposals officially presented on Tuesday by the German Aerospace Research and Testing Institute (DFVLR), the aim of which is the establishment of a "National Space Commission." The new chief executive of the DFVLR and former president of the University of Marburg, Prof Walter Kroell, indicated at the science press conference in Bonn that Minister for Research and Technology Heinz Riesenhuber (CDU) is currently examining the recommended organizational model. The Munich firm Industrieanlagen-Betriebsgesellschaft (IABG) recently performed its own assessment of possibilities for improving organizational structure in space activities. The proposals ranged from the establishment of a special space agency on a foreign model--such as NASA in the United States--to improvements in the responsible ministries.

According to Kroell, the DFVLR model provides for a "layered" structure for the agency: A National Space Commission, comprising a permanent interministry committee supported by a staff of experts in the field, is proposed as a political body with a steering function. It could be headed by the minister for research and technology, although Kroell did not rule out the possibility that this position could be filled by the permanent coordinator for aerospace issues with the federal government. In the new administration, this is the parliamentary state secretary in the Ministry for Economics, Erich Riedl (CSU).

The Commission is intended to organize space planning, and is to have binding authority over it as well as over the budget of a National Program and Project Organization within the DFVLR. This "costs less and is less personnel-intensive," Kroell said, than an organization outside the DFVLR, which currently employs just under 4,000 people and was responsible for the project.

Besides the proposals on improving space organization, the DFVLR chief executive announced that the institute is drawing up, in conjunction with 15 industrial companies and 15 college institutes, a program for further high-tech developments in the space field. Without providing details, Kroell's description indicates that this involves those technologies that are needed for future space stations and transport systems as well as for the necessary infrastructure on earth. As examples of space transporters of the future that can all be used as hypersonic airplanes travelling at five to seven times the speed of sound, he mentioned the "Sanger" (FRG), "Orient Express" (United States) and "even times the
speed of sound, he mentioned the "Sanger" (FRG), "Orient Express" (United States) and " French "Hermes" space
shuttle project.

12271
CSO: 3698/445

FRG SUBSIDY, DM 3 BILLION FOR AIRBUS IN 10 YEARS

Clearing Old Debts

Duesseldorf HANDELSBLATT in German 8-9 May 87 p 18

Bonn, 7 May (DPA)--According to indications coming from industry, the Airbus project, in the throes of a crisis surrounding its economic feasibility and financing, is to receive an additional figure of around DM 7 billion, spread over the course of several years, as support from the federal government. This was made public in Bonn before Federal Minister for Economics Martin Bangemann (FDP) and his parliamentary state secretary, Erich Riedl (CSU) reported to the Bundestag Budget Committee "on further support and future financing of the Airbus program."

Thus far, Deutsche Airbus GmbH in Munich, a subsidiary of the aerospace firm Messerschmidt-Boelkow-Blohm GmbH in Ottobrunn, has been promised DM 5.6 billion in federal funding, of which DM 4.2 billion had already been paid at the end of last year. The new DM 7 billion is designated to take care of the "old debts" from the jumbo medium-range models A300 and A310 (amounting to DM 2 billion in loans and guarantees), as well as development cost subsidies, serial financing and guarantees for the new medium-range A330 airplane and the first Airbus long-range model, the A340.

The federal government is to provide DM 3 billion, spread over the course of 10 years, for these two projects alone. Around DM 122 million is being requested for 1987 (the budget provides for DM 200 million), and the figure for 1988 is just under DM 300 million. The highest annual figure would be DM 570 million in 1991. This would drop to only DM 16 million in 1996, the last year of the planning schedule.

MBB Needs Industrial Partner

Duesseldorf HANDELSBLATT in German 8-9 May 87 p 18

[Text] DM 7 billion from the federal coffers over the next 10 years is a great deal of money for the continuation of the Airbus program. Granted, three billion of this is for the much-discussed "expansion of the family" through two long-range models, the A330 and A340, but the larger chunk of four billion is ultimately designed to ensure that Europe and in particular the FRG

have a significant say in the production of passenger aircraft. It is almost the same amount that has already be appropriated for federal funding of Airbus--funding that could not be raised in any other way, given the high cost of production in Europe, industry's inadequate financial base and because of the "mixed calculation" of public contracts from the military and in aerospace, which would have been possible only to a limited extent. All of this is different for the U.S. competition.

The question now arises of what is more expensive--to dig into our pockets once again, or to cancel the family expansion, with negative consequences for the existing programs, thus indirectly pushing Messerschmidt-Boelkow-Blohm into bankruptcy. DM 7 billion is what industry--and thus, MBB and its subsidiary Deutsche Airbus GmbH--wants; this is certainly not the figure that the federal government can and will pay. It continues to be necessary to create a broader basis for Airbus financing from financially strong companies. Little has been learned of the progress of talks held to this end with Daimler-Benz, Bosch, Siemens and other companies, which are currently profiting not at all or only indirectly from the Airbus program.

It is at any rate time for a decision. An international aviation exhibition will be taking place in Paris during the second week of June, and the die for the A330/A340 program must be cast before then. In France, the possibility of inadequate financial assistance is not even being discussed, and in England current discussion of the contributions by the British government is more a round of haggling than a serious questioning of British participation in the new airplanes.

12271
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FRG'S SPACE SHUTTLE SANGER DESCRIBED

Bern TECHNISCHE RUNDSCHAU in German No 7, 1987 p 73

[Article by Men J. Schmidt: "German Sanger Counter-Project"]

[Text] There is new competition for the French Hermes system and the British Hotol: the "Sanger-2." The European Space Agency (ESA) has two goals to be achieved by the end of the century: a space transport system for manned flights, and a reusable space shuttle. France, Great Britain and the FRG have now presented the ESA with relevant studies.

While the French have proposed a small space shuttle named Hermes, the British are vehemently promoting the single-stage, reusable "Hotol" space shuttle (TECHNISCHE RUNDSCHAU, 4/86). Now the FRG as well has proposed a reusable space transport system. The German project bears the name "Sanger-2." The rocket pioneer of the same name proposed an airplane-like rocket for space travel as early as during the 1940s. Eugen Sanger's idea was seized upon in 1963 by the German company Junkers. Under the name "Sanger-1," studies were conducted on a reusable system consisting of two airplane-shaped rockets with their "bellies" adjacent to one another.

500 Ton Take-Off Weight

In a second approach, the idea of a dual-stage, fully reusable space shuttle is now being restudied by the aerospace company MBB (Messerschmitt-Boelkow-Blohm). "Sanger-2" also consists of two airplane-like stages that are launched "piggyback" and have a combined take-off weight of 500 t. The launch is horizontal, as with a normal airplane. The first stage here is a hypersonic airplane that is equipped with so-called "air-breathing" power units. These units pull in the oxygen for fuel consumption from the atmosphere. This means that much less oxygen must be transported in the tanks, leading to lighter overall construction. As soon as "Sanger-2" has reached a speed of mach 6 (1,800 m/s) at a height of approximately 35 km, the rocket engine in the piggyback stage ignites, sending it into orbit. In the meantime, the empty first stage glides back to the launch site, where it is overhauled.

The second stage of "Sanger-2" also returns from orbit to earth after completion of its mission and can be reused. According to available studies,

the first stage is 50 m long and the delta wings have a span of 25 m. The second stage is about half that size. It weighs around 55 t and achieves near-earth orbit 8 c (approximately 300 km) weighing 15 t. One significant advantage over all other proposed or operational space transport systems is that the "Sanger-2" can take off and land at any European airport, depending on the desired inclination of orbit and the type of mission.

The "Sanger-2" system could be operational by the year 2005, thus 10 years later than the French Hermes proposal. Experts agree that the Hotol or "Sanger-2" projects clearly have a chance of being realized, but that the Hermes intermediate step is necessary in order to gather relevant experience. On the cost side, the fully reusable systems are naturally more expensive than Hermes. Experts estimate the developmental costs of "Sanger-2" at $10 to 12 million, compared to around $5 billion for Hermes [as published].

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FRG CONDUCTS MATERIALS RESEARCH IN MICROGRAVITY

Bonn BMFT-JOURNAL in German No 2, Apr 87 p 4

[Article: "Space Travel May Prove Worthwhile in the Production of Materials: Material Properties Are Being Researched Under Microgravity"]

[Text] MAN, MTU, Thyssen, Krupp and the Foundry Institute of the Rhenish-Westphalian Technical College at Aachen have initiated a joint project for elaborating technologies for improving materials using microgravity. The project is designed to conduct research on potential industrial applications for optimizing the material properties of component parts. The initial range of the project is 3 years. Support by the Federal Ministry for Research and Technology during this first phase comes to DM 6.1 million.

The joint project is a new approach in the area of materials research under microgravity. It deals with problem areas on which research has already been conducted in series of individual experiments in laboratories on earth as well as on Spacelab.

In addition to solving scientific and technical questions, the project is also designed to form a foundation for assessing applications on a more long-term basis. Of particular relevance and interest here are turbine blades.

Turbine blades are highly-specialized technical components of extraordinarily great economic importance because of their use in stationary and mobile turbines, such as in airplane engines. A significant amount of effort has always been made to increase heat resistance in earth alloys. The superalloys used thus far represent the epitome of present technological possibilities in terms of the achieved degree of complexity involved in inducing desired properties. The result is a high specific price, which today is in the range of several thousand German marks per blade at a weight of around 100 grams. Moreover, the demand for the production and overhaul of airplane gas turbine blades is so high that even modest improvements through production in space would make the possibility a very interesting one.

It is not yet possible to assess the anticipated increase in quality from the production of monocrystal, dispersion-reinforced blades under microgravity. However, if it is possible to increase the permissible material temperature by

around 50 to 100 degrees Celsius, space travel could prove to be quite worthwhile.

Realizing this, a group of potential alloy producers and users, as well as research institutions, have come together in this joint project. Their interest is influenced by the cooperation that they have already put into practice in the development of superalloys. By concentrating on a promising area and pooling available know-how, a decisive step beyond the current level of top earth-based technology should be achieved.

12271
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FRG: ION ENGINES PROMISE GOOD PERFORMANCE FOR SPACE ROCKETS

Stuttgart BILD DER WISSENSCHAFT in German No 4, Apr 87 p 11

[Article by Horst W. Koehler: "Ion Engine Faces Space Trial"]

[Text] A quiet alternative to thundering chemical rocket engines is the ion engine. Although it is not possible to launch with them, they are ideal in space. German scientists in particular are emphasizing work on these engines.

A ride on a chair of fire--not only a vivid image for a launching rocket, but also an appropriate description for how a rocket works: The fuel burns, and through this violent chemical reaction the exhaust gases are expelled towards the rear at high speeds. According to the reaction principle, the rocket is thus shot forward. During a vertical launch, it "rides" on the jet of fire.

However, chemical combustion is not the only thing that can cause reaction. As early as 1929, German rocket pioneer Hermann Oberth determined in his trailblazing work "Wege zur Raumschiffahrt" [Paths to Space Travel] that much higher jet velocities could be achieved with electric rocket engines than is the case with the chemical rockets that are standard today; the limit for jet velocity in chemical engines is 5 km/s due to the limited energy content, even where high-energy fuel combinations are being used.

Electric engines transform non-chemical primary energy (nuclear or solar energy) into kinetic radiation energy using an electric intermediate link, making possible speeds of 50 km/s and greater. Electric rockets admittedly generate extremely low thrust (around 1 Newton; 1 N corresponds to around 0.1 kp), and thus very low flight acceleration. Even if they are consuming small amounts of fuel, they must remain in operation for months before the high final velocities are achieved.

These factors have a clear bearing on the areas of use of electric engines. Potential applications range from so-called secondary engines in satellites (in order to compensate for disturbance forces) to sustainer engines for interplanetary probes.

Operation of these engines must thus always take place in a neutral area; a launch from earth is pointless due to the tiny thrust factor. Another

interesting application would be the use of ion rockets in future comet exploration craft.

Since 1961, work has been conducted on ion engines with high-frequency ion sources and mercury as fuel at the First Physical Institute of the University of Giessen. This type of engine, named RIT for Radio Frequency Ion Engine, has since then been made operational. It is evenly matched to its U.S. competition in both stage of development and system performance. In the meantime, almost all European partners have discontinued work on competitors.

RIT-10 (the number 10 indicates the diameter of the discharge vessel in centimeters) was built as a flight engine by MBB on behalf of the Federal Ministry for Research and Technology as a national project under the leadership of the German Aerospace Research and Testing Institute (DFVLR), with the cooperation of the University of Giessen. Its 10,000 hours of testing in Stuttgart revealed the following technical data: fuel velocity 31 km/s, thrust 10 mN, fuel consumption 0.33 mg/s, fuel efficiency 80 percent.

The first deployment of RIT-10 in space was originally planned for the German direct television satellite TV-Sat. However, this deployment fell through in 1980 because of lack of money; a serious blow to the electric engine sector.

Nevertheless, prospects are once again good. It has been possible to increase thrust to 25 mN, and the space test of RIT-10 is now expected to take place on the reusable ESA platform EURECA (European Retrievable Carrier, the initial launch of which is expected to be in the spring of 1988).

The larger RIT-35 engine is considered throughout the world to be the most efficient ion engine. With thrust of 200 mN, 37 km/s jet velocity and 4.0 mg/s consumption, this engine is currently in industrial production by MBB.

A study has been conducted on a 2.3 t asteroid probe, AGORA, which is to be propelled by six RIT-35 engines. For AGORA's total operational time of around 2,200 days, the required average operational time of an RIT-35 engine is 9,200 hours.

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FINLAND EAGER TO PARTICIPATE IN SPACE PROJECTS

Helsinki KANSAN UUTISET in Finnish 17 Apr 87 p 24

[Article by Tiina Ruulio: "Finland Has Strong Desire for Space Programs"]

[Text] Finnish space research and technology has a strong desire to participate in international space projects. One of the more distant dreams is to participate in a Mars exploration team.

A miniature rocket or a sci-fi enthusiast will of course say that space activity is also about much more than mere research and construction of devices. Space is also always about mystery and the unreachable.

Finnish space research began with tracing the path of Sputnik I. Today Finnish space activity involves the manufacture, use and export of radars, antennae, communication satellite components, weather and mapping satellites.

To expedite its space activities Finland became a member of the European Space Agency, ESA, at the beginning of the year. Now our research institutions and universities are enthusiastically building various prototypes for large international space programs.

Physicist Johan Silen of the Meteorological Institute participated in an inauguration of an exhibition, describing Finnish space activities at the Finnish Aeronautical Museum, only a stone's throw from the Helsinki-Vantaa airfield.

Silen says that Finland has the possibility of selling its devices primarily to two ESA programs, the CLUSTER and SOHO projects. The CLUSTER-satellite will be sent with the space shuttle in due time to study physical phenomena of the Earth's inner space. SOHO's place in space is in continuous sunlight between the sun and the moon where it monitors the sun's activity.

For the time being no electronic space instruments have been sold for these West European ventures. The Finns have developed prototypes and await for the propitious time and place to enter the ESA market.

Space instruments built in Finland will also fly in Soviet satellites and space probes by the end of the decade. Finnish space research and technology has managed to get itself into the Soviet INTERBOL-program which studies the earth's magnetosphere (i.e the area occupied by earth in space). The Finnish contribution to the program involves, for example, the study of the aurora borealis.

Only a Small Slice

Nokia's production chief Harry Herlin thinks that altogether Finland will get only a small slice of the space instrument manufacturing market. One slice of the space devices export cake has been the equipping of communication satellites such as TELEX. According to Herlin another slice could involve the making of satellite programs.

Herlin claims that it is impossible for Finland to offer its space devices and know-how to the West without membership in ESA, because information is circulated and business conducted only among the members.

Nokia's production chief assures us that the civilian space research and business are completely separate from the military uses of space. At least a businessman can not believe that ESA, NASA and Star Wars are one and the same space business.

Finnish space business now amounts to a 30 million markka annual pot. One third of the sum derives from ESA members' orders. Belonging to the space club thus means automatic member orders related to the amount of the membership dues they pay.

No Lack of Enterprise

Finland does not lack desire to join in the international space business; the official Space Affairs Committee has prepared a space program for the immediate future. The VTT has a three-year space technology program under way. Valmet, Salora and Nokia, each has a strong desire to participate as sub-contractors in the European ESA, the U.S. NASA and the Soviet space programs. Even the production of various components for a given program is a real gold mine for any one of the enterprises because the programs last a long time and each member nation invests much of its intellectual and economic resources in them.

However, space activities are much more than the manufacture and use of devices to gain or transmit information. Scientific literature, astronomy and space research borrow much from one another. Every space researcher, investor in the field, astronomer and the builder of model rockets has undoubtedly read science fiction.

The chairman of the space research society Bernt Hoffren represents those for whom space research is a good pastime. "Man wants to know about space because he has an inherent drive to get into places where no one has been before him. This is why polar explorers, divers and space researchers have much in common.

12989
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NORWAY IN ESA: CONTRIBUTIONS, GOALS DETAILED

Experience, Support Available

Oslo AFTENPOSTEN in Norwegian 3 Jan 87 pp 1, 8

[Article by Rolf F. Larsen: "Norwegians Out In Space?]

[Text] That Norway as of the turn of the year has joined the European space travel organization, ESA, could be of great importance for Norwegian research and industry. The government has proposed that 110 million kroner be used for space efforts this year, 88 million kroner of this to ESA. Seventy percent of the contribution will return in the form of contracts for Norwegian industry and research.

A space center is to be established in Oslo. Project Leader Georg Rosenberg of NTNF's [Norwegian Council for Scientific and Industrial Research] Space Division emphasizes that Norwegian high technology in the field will be marketed through ESA. Norwegian technology students and researchers are being urged to apply to the organization. Norway should also be able to contribute with crew members for manned space projects.

"We Are Qualified for the Space Age"

Norway is a space travel nation. With the turn of the year we became a full member of the European space travel organization, ESA. Great challenges face us in the space age, first and foremost in research and industry. "Only a few Norwegians work at this organization today. There ought to be far more of us, and I recommend that Norwegian researchers, engineers and technology students begin there. Why would Norwegians not be qualified for such jobs, both on the ground and in space in the future?" Project Leader Georg Rosenberg of the Norwegian Council for Scientific and Industrial Research (NTNF) says to AFTENPOSTEN.

This division was established in 1965. It has 15 employees today. They will form the core of the Norwegian Space Center, which will consist of a total of about 25 people. The center will be at Smestad in Oslo. The "ground crew" will be ready to move in around Easter time.

"The center's staff will be technology brokers between research institutions and industry here at home and ESA and the other 12 European member countries of the organization. We will in short market what we can contribute with here at home in European space efforts. Up to now Norway has had most to contribute on the ground."

User Systems

"Norwegian research and industry have developed important user systems in telecommunications, navigation and telemetry. We must continue to strengthen and develop this background. Through ESA Joint ventures we now also have opportunities for participating to a greater extent in basic research and outer space. This will provide Norwegian research circles a solid 'platform' in space, outside the atmosphere. With all the fantastic challenges this will provide," Rosenberg says.

The government has proposed that about 110 million kroner be used for space this year. About 88 million kroner of this will go to ESA. Seven million kroner will be used for national space research programs, and 15 million kroner for other measures in this sector in Norway. Norway became an associate member of ESA in November 1981. Belgium, Denmark, France, Ireland, Italy, the Netherlands, Spain, Great Britain, Switzerland, Sweden, West Germany and Austria are ESA members today. A total of 13 countries, including Norway. Finland is an associate member.

[Question] What does ESA membership involve, and what advantages does it provide?

[Answer] "Norwegian membership is important in both the industrial policy and technology contexts. ESA practices the principle of 'fair return,' i.e., an individual member country can count on about 70 percent of contributions made coming back, in the form of contracts for Norwegian industry and research and high-technology goods and services. This calls for determination to make a contribution, both by the public sector, research circles and industry."

"The Storting Industry Committee is to visit ESA's headquarters in Paris in the beginning of February. In addition, Norwegian representatives will also study the national space centers in France, West Germany and Great Britain," Rosenberg says.

ESA was established in 1975. The organization has a staff of about 1400 today. Only a handful are Norwegians.

"Apply to ESA"

"Now that Norway is a full member we want more Norwegians in ESA. We are therefore urging Norwegian researchers, engineers and technology students to apply to the organization. It is important that we get more Norwegian 'ambassadors' in ESA. The knowledge they build up concerning the organization and space efforts can later benefit both Norwegian research and industry."

Rosenberg also believes that Norway ought to be able to contribute with Norwegian crew members if we take part in any manned space projects in the near future. "Norwegian girls ought to be just as relevant here as fellows. The girls' contributions in sports show that they have important qualifications which can make them good astronauts," he says.

[Question] Does "little Norway" need efforts in space?

[Answer] "It is only the major powers that have user interests in space equivalent to Norway's. We are a small country as far as population is concerned, but are very big in area. In addition to mainland Norway, we also have large ocean areas, land areas in the North, and important interests in Antarctica. For this reason we have already taken part in developing and putting into service useful and important space technology: satellite communications and navigation for merchant ships, fishing vessels and oil platforms, and satellite telemetry for monitoring the environment and economic zones at sea."

"We are also a good user of satellites for public telecommunications with other countries, and nationally we now transmit TV via satellite to Svalbard, the North Sea and remote places in the country. The Telecommunications Agency has been far-sighted as far as this kind of use of satellites is concerned, and Norway is today a pioneering country in the use of such services. We have shown that we are good on the ground in space efforts. Now we should also take part in the challenges in outer space itself," Project Leader Georg Rosenberg says.

Norwegian, FRG Collaboration Valuable

Oslo AFTENPOSTEN in Norwegian 6 Jan 87 p 4

[Article by Rolf L. Larsen: "North Sea Experience in Space Travel"]

[Text] Trondheim. Norwegian expertise from underwater technology can in several areas be transferred to space technology. This has been shown by the results of a German-Norwegian study project. There are, among other things, many similar features between space travel and underwater operations as far as the use of remote-controlled robots is concerned. Adaptation of the human being to the environment under water and in space also shows parallels.

"In Norway we have several concerns and research institutes which have built up experience in these areas through the oil operations in the North Sea," Project Engineer Geir Hovmork said yesterday during the Curriculum Days in Trondheim. Hovmork works in the space efforts division of the Norwegian Council for Scientific and Industrial Research (NTNF).

"This is usually done in water basins. Here it is possible to simulate to a certain extent work which is to take place both in and outside a space vehicle," Hovmork said.

"The ocean basin here in Trondheim is, with its enormous dimensions, actually large enough to hold simultaneously both the European space shuttle which is

being planned and several other space components. The European space travel organization, ESA, has already begun to evaluate the use of this ocean basin," Geir Hovmork reported.

The Kongsberg Weapons Plant is negotiating with the French CNES space organization regarding the fastening and separation mechanisms for the carrier rockets for the Ariane-5, which is to be launched in 1994. This will be able to produce development and production to about the year 2010.

On the ground side, we have gained experience, through other ESA projects, in gathering and processing satellite data. There will be a great need for this with the development of possible European space systems and platforms.

Norsk Data has, through its agreement with Matra Data in France, gained a firm foothold in European space efforts.

More Experts Needed

Oslo AFTENPOSTEN in Norwegian 6 Jan 87 p 4

[Article by Rolf L. Larsen: "Shortage of Specialists"]

[Text] Trondheim. "There is need for a reasonable all-out effort to rectify the situation the country has gotten into. One reason for qualified optimism is that our central politicians now seem to have realized what kind of infrastructure of specialists we have here at home. Now there remains a rapid and concentrated effort to solve the problems. It is /now/ [in italics] that we have a shortage of specialists, and it is now and in the next few years that we have the big youth generations," President Dag Kavlie said during the opening of Curriculum Days 1987 at the Norwegian Technical College yesterday.

This year's curriculum days assembled about 1000 participants. Power engineering; heating, ventilating and air-conditioning systems; highway planning; and European joint space travel efforts; all together. The curriculum days are the 29th in a row, and are a cooperative affair between the college and the Norwegian Graduate Engineers Association (NIF).

Kavlie noted in his speech that there is between realization and action a chasm which can seem difficult to cross.

"In a situation in which energy and consistency are needed first and foremost, it can be problematic to have a parliamentary situation which is so disordered as now. At the same time, the statement concerning the necessity of putting our money on education and research did come from most political parties. We hope that this agreement will also result in majorities for concrete measures in the time to come," Kavlie said.

NTH [Norwegian Technical College] has proposed a limited-time education project in which 100 extra students in electronics and computer technology will be taken in per year for five years. The college can handle such an increase by renting and hiring the required premises and teaching talent.

"The college has applied for money for the project from the funds set aside for the strengthening of information technology in the Culture and Science Ministry's budget, but at present has not been promised the funds. At the same time the college has proposed an expansion of post-graduate offerings in information technology. The need to update oneself in the field is great and growing for those who got their education a few years back, and NTH feels a distinct responsibility for covering this demand," President Dag Kavlie said.

President Sven A. Holmsen of the Norwegian Graduate Engineers Association (NIF) pointed out the need for post-graduate training for the association's 21,000 members. "Last year we experienced a record increase in business for NIF's Study Center. We see this as a clear sign that firms and government departments are prioritizing study and post-graduate work in times of economic downturns also. The Study Center, which is the country's biggest organizer of technical courses, last year had over 37 million kroner worth of business. This is a 30-percent increase over the previous year. In 1986 there were over 11,000 participants who found their way to our approximately 200 courses."

Holmsen emphasized also the opportunities Norwegian industry has now that Norway is a full member of the European space travel organization, ESA. Staking on space travel technology will stimulate growth in Norwegian research and development work within already established sectors, Holmsen believed.

"However, we must be aware of the fact that staking on space travel technology involves the fact that we must also strengthen education in the technology sector. If our education capacity is not built up, this can result in the fact that Norwegian technologists are transferred to an even greater extent than today from job fields in which the need for technological manpower is also great."

"Norway's placing its stakes on space travel efforts will of course require public resources. But I am sure that industry itself will be able to make a relatively strong financial contribution to this joint effort," Holmsen emphasized.

8831
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EUREKA: 14 CAR MANUFACTURERS IN PROMETHEUS PROJECT

Munich-Ottobrunn BMFT-JOURNAL in German No 1, Feb 87 p 13

[ARTICLE: "'Intelligent' Technology Intended to Make Highway Traffic Safer and More Environmentally Sound: 14 Car Manufacturers from Five Nations Working Together on 'Prometheus'"]

[Text] A fundamentally new approach in research is intended to increase traffic safety with the introduction of modern electronics within the vehicle and with the construction of associated traffic information, communications and guidance systems. There are still over 50,000 traffic deaths in the EC each year, more than 1.7 million injuries--of those over 150,000 are permanent injuries--and economic losses of more than 3 billion ECUs.

The Eureka project "Prometheus"--Programme for a European Traffic with Highest Efficiency and Unprecedented Safety--is an attempt to find a new integral approach, from the point of view of safety, to solving problems in the overall traffic system. Since June 30, 1986, Prometheus has been a Eureka project within the European Union of Industry, Science and Management. The possibilities which exist in the new information technologies for structuring a safe, environmentally sound and high-performance traffic network of the future are to be applied in this project. During the one-year definition phase which began on October 1, 1986, the BMFT (Federal Ministry for Research and Technology) has made DM 9.96 million available to four German automobile manufacturers (BMW, Daimler-Benz, Porsche, VW) and four scientific institutes. The proportion of funding amounts to 40 percent for industry and 100 percent for the institutes. The Prometheus program includes the following main areas of research:

Computer-Aided Driving

"Intelligent" technology is intended to help the driver to better manage critical situations. An example is the active assistance provided to the driver by highly developed mechanisms which recognize dangerous situations and help enhance his ability to react.

Communication Between Vehicles

This is intended to produce a safety system which will take steps at the proper time so that the driver can avoid conflict. In the case of accidents in the fog, for example, there is the danger of subsequent accidents (chain-reaction accidents). These could be made less serious or avoided by means of hazard information which is understood by vehicles coming up on the accident.

Communication Between Vehicles and Roadway Facilities

Depending on the current traffic situation, drivers could be provided with information on the most favorable routes to their destinations. This helps the driver avoid overcrowded areas and traffic jams, improves the flow of traffic and thus leads to better utilization of the available highway network.

Prometheus is being supported by 14 European automobile manufacturers from five countries. Within one year it has developed from an idea into an important fundamental program. The goals and multi-faceted objectives of Prometheus, however, extend far beyond the motor vehicle industry. Therefore, the automobile manufacturers are working closely with the manufacturers in the modern communications and information technologies and at the same time are being supported by the knowledge and the work of traffic experts, as well as by research institutes.

However, Prometheus also has an affect on the direct responsibility of nations with regard to their preventive function in terms of traffic safety and environmental protection. The administrative agencies responsible are therefore being included in this union at the national as well as at the European level.

12552
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SWEDISH VOLVO'S DIVERSIFICATION, INVESTMENT POLICIES VIEWED

Duesseldorf HANDELSBLATT in German 18 May 87 p 30

[Article by Udo Rettberg: "Rising Investments to Ensure Growth"]

[Text] Declining sales and returns with concomitantly rising dividends characterize the 1986 business year for Volvo AB, one of the world's leading automobile manufacturers. The company, which has its headquarters in Göteborg, has continued to invest in traditional areas in the past 5 years, and, at the same time, pursued a closely directed policy of diversification.

Volvo AB has undergone a fundamental transformation in recent years. The company, which was previously active only in the passenger car and commercial vehicle fields, has created additional supports for itself, in order to reduce the risks in the cyclical automobile business. Volvo AB has penetrated previously alien markets, in such areas as the navy, aviation and space travel, energy and trade, as well as foodstuffs, and is unsettling the competition.

The automobile area--primarily the passenger car business of the Volvo Car Corporation--is still the largest contributor to both sales and returns.

Last year Volvo AB's sales dropped from 86.196 billion Swedish kronor to 84.090 kronor. Profit per share--calculated using the standard tax rate of 50 percent--dropped slightly from 49.20 kronor to 48.20 kronor, as the initial figures for last year's business transactions indicate. According to management, the modest decline in profits is attributable to high investment costs.

In spite of the decline in sales and returns, the company is paying out a dividend that has gone up from 8.50 kronor to 9.25 kronor. The number of workers employed in the Volvo concern has risen from 67,857 to 73,147.

In a conversation with the HANDELSBLATT, company president Roger Holtback states: "1986 was a record year for the Volvo Car Corporation." He said that they had been able to increase sales of passenger cars by about 7 percent, to 420,000 vehicles. Holtback is optimistic about the future situation concerning returns: "During the past 12 to 16 months we have managed to increase our competitiveness substantially."

He added that Volvo's financial situation was good; it had a very good cash flow and a very healthy balance. The United States continued to be the most important market for his company. Volvo has a market share of 1.3 percent there. A record number of 111,086 Volvos was sold in the United States last year, 8.6 percent more than in the previous year. According to Holtback, Volvo was the most important automobile supplier in the United States in terms of money. Volvo plans to consolidate this position. In 1986, about 93,500 cars were sold in Scandanavia, the second most important market.

Holtback thinks that it is possible to strengthen sales and marketing activities on the Japanese market. However, future activity would still be concentrated principally on Europe and the United States.

He said that the Volvo Car Corporation was currently in an intensive development phase. Last year an advanced wind tunnel and a new pilot plant were built. Considerable progress had also been made in computerization and in communications. This would eventually result in even greater improvements in vehicle technology. The Volvo Car Corporation has made large investments in the new factory in Uddevalla. Cars are scheduled to come off the assembly line starting in 1988; by the early 1990's, 80,000 Volvos annually will go to all parts of the world from Uddevalla.

The company is also considering additional investment to expand its factories in Ghent, Belgium and Halifax, Canada. The idea of safety--which has occupied a dominant role at Volvo for years, together with the idea of quality--was pushed ahead last year, when the company designed innovative special safety equipment for children of all ages.

9581
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EUROPEAN CONFERENCE ON BIOTECHNOLOGY PATENTS, LEGAL ASPECTS

Duesseldorf CHEMISCHE INDUSTRIE in German No 3, 1987 pp 9-10,12

[Article: "Clear Patents for Biotechnology Are Necessary"]

[Excerpts] Dynamic and worldwide developments in biotechnology are being reflected in the area of law as well. However, industrial companies have only just begun discussion of problems emerging from the correlation between biotechnology and legal protection of industrial property.

Industry needs clear and reliable foundations for legal protection of industrial property in the area of biotechnology. This was the message of Prof Dr Juergen Quadbeck-Seeger, chairman of the board of directors of Knoll AG, at the meeting of the Association for Legal Policy and of the Max Planck Institute for Foreign and International Patent, Copyright and Competitive Law in Munich, addressing the topic "Biotechnology and Legal Protection of Industrial Property." He went on to say that the report of the German Bundestag inquiry commission on "Chances and Risks of Genetic Engineering" (cf. "Genetic Engineering: The Burden of Responsibility," CHEMISCHE INDUSTRIE, Feb 87) scarcely addressed the question of legal protection of industrial property. In the podium discussion on the topic "On Future Developments in the Legal Protection of Industrial Property in the Area of Biotechnology from a German, European and International Point of View," which concluded the conference, Dr Albrecht Krieger, a department head in the Federal Ministry of Justice, acknowledged that the Ministry of Justice was just now beginning to confront the issue, and that at present it is not yet possible to address the question of what legislative action needs to be taken.

The preliminary draft EC guidelines dealing with harmonizing national patent law in the area of biotechnology were announced by Dr Schwab of the Intellectual Property Department, Unfair Competition, Main Office III of the EC Commission. He also pointed out that work is similarly underway on draft guidelines dealing with protection of plant varieties. Dipl-Eng Johann Haugg, general director of the European Patent Office in Munich, also noted that even without legislative changes, a more flexible application of the current law by the officials of the European Patent Office could lead to considerably greater fulfillment of the justifiable wishes of patent applicants in the area of inventions in genetic engineering.

On Its Way to World Leadership

The podium discussion was preceded by two days of presentations of papers that dealt with both the scientific foundations of biotechnology and the broad field of legal patent protection. West German industry is on its way to world leadership in the area of genetic engineering, said Prof Dr Hans-Georg Gareis, member of the board of directors of Hoechst AG, in his introductory talk on "Fields of Application and Economic Significance of Biotechnology--The FRG in an International Comparison." Because of the enormous financial expenditures required for research in this area, however, adequate patent protection is indispensible, he said.

A concise overview of the fundamentals of fermentation technology and genetic engineering was followed by references to individual questions. Among other things, Gareis noted that genetic changes of animals must be carried out on the egg and sperm cells in order to obtain, for example, an improvement in the protein content of meat for human consumption. Gareis emphasized that the research industry agrees totally that there should be no interference with human germ cells. On the other hand, genetic therapy could introduce new healing processes for humans.

Comprehensive Patent Protection

In his speech, "Does Genetic Engineering Open Up New Possibilities for Specifying Inventions in the Area of Living Nature?--Current Situation and Prospects," Prof Dr Ernst-Ludwig Winnacker, director of the Genetic Center of Ludwig-Maximilians University in Munich, explained that for an amino sequence the problem of the reproducibility or deposit of research findings as a prerequisite for granting a patent could in the future resolve itself through possibilities of exhaustive specification. For humans, with five billion constituent elements, for example, 16 to 18 sub-sequences would suffice in order to clearly define a gene. Moreover, a specialist is capable of isolating the other components through DNA tests. To this extent, there is no problem with reproducibility, he said.

In the meantime, Winnacker noted, a precise systematic specification of mutations is also possible in some biotechnological methods. It is possible today to synthesize up to 1,000 basic pairs. The problem with plants and animals, however, is that the organism itself is of interest, while biological reproducibility cannot be protected under patent law, he added.

On the other hand, plant variety protection law carries with it the disadvantage that it protects the seeds, but not the products or sales. In contrast, biotechnological successes with classical breeding methods cannot be achieved.

Winnacker thus spoke out in favor of granting, in addition to class protection, comprehensive patent protection. In the patentability of animals, study should be devoted to the ethical question of the extent to which methods for producing transgenetic animals (each cell receives the new gene) are justifiable.

Needs of the Applicants

Dr Klaus Daenner, leader of the patent division of the pharmaceuticals branch of Bayer AG, focused in his paper entitled "Needs of the Applicants for Patents for Biotechnological Inventions" on four requirements for an adequate structuring of the instruments of patent law, with which the needs of the applicants for patents for biotechnological inventions can be described:

--Each inventor should receive the best protection and also be able to enforce it;

--Protection should be pragmatic and flexible;

--As few additional formal requirements as possible should be imposed, and as few application costs as possible should be charged;

--Protection should be as internationally uniform as possible.

One aspect of the total question concerns general protection for microorganisms, which is theoretically possible, although in practice infeasible in the FRG, since the biological propagation of microorganisms is not regarded as a sufficient specification. Daenner noted in this context the legal situation favoring applicants in Japan, the United States, Switzerland and Austria. The Austrian legislature, for example, has clarified that the protection of microorganisms is possible and that all that is necessary for disclosure is that a specimen be deposited no later than on the date of application, that this be indicated in application, and that the identification number of the depository be simultaneously given to the Austrian Patent Office.

Current Legal Situation

Several speeches addressed the present-day situation of international and national law. Dr Frank Goebel, managing government director at the German Patent Office pointed out in his speech "Biotechnological Inventions and Patent-Granting Practices of the German Patent Office" that a total of 52 applications for genetic engineering inventions were submitted to the German Patent Office between 1982 and 1986 and that 18 patents were granted in the same period. There were 105 applications and 24 patents granted by the European Patent Office.

In a commentary on the "baker's yeast" ruling by the Federal Supreme Court, Goebel noted that even though this ruling affirmed protection of products generated by microbiological inventions, an exhaustive specification is required as a condition for reproducibility. The German Patent Office, he said, accepts a deposit of organisms, which must take place no later than on the date of application. The ratification legislation to the Budapest agreement has left this question open, he added.

The German legal situation differs from that in the United States, where deposit in one of the applicant's laboratories at the time of application is sufficient, and where all that is required is that the applicant have a

specimen in his possession on the date of application, Goebel said. The West German approach, he said, is aimed at ensuring that the application is being made for one and the same thing, meaning that deposit with an independent depository is necessary. In laying claim to priority, the law in the country in which the second application is submitted is decisive in judging the validity of the second application, Goebel noted.

The problem of deposit was also addressed by Dr R. Teschemacher, head of Legal Services at the European Patent Office, in his paper "Biotechnological Inventions and Patent-Granting Practices of the European Patent Office." Deposit, Teschemacher said, assures the reproducibility of the invention. Deposits must be made with an independent third party since the deposited living material may not remain under the power of the applicant.

Teschemacher explained that the basic rules apply to general product protection. Thus, in keeping with Article 84 of the European Patent Agreement (EPUe), patent claims must have sufficient support in their specification. Known microorganisms cannot be protected since they are no longer new, even if they have been produced by a new process or if their use is limited to new applications. In these cases, there is only a procedural claim in keeping with Article 64, Paragraph 2 of the EPUe. According to a recent decision by the Main Chamber of Appeals of the European Patent Office, however, an additional pharmaceutical indication--a product claim for a new galenic preparation--can be recognized as eligible for patent, although the new form of administering is not creative, he said.

On the difficult nature of distinguishing between biology and microbiology, Teschemacher said that the difference between molecular biology today and in the past is that now work is being done with plants and animals. Thus, hybridoma technology was used in the production of monoclone antibodies, and the immunization of mammals through antigens was made technically possible. In these cases, Article 53b, Paragraph 1 of the EPUe is applicable, he said. This means that the exclusion from patentability does not apply. The same is true for protoplastic fusion, he added, since its content is the intended unification of single cells into a new fusion product. However, this could be different if a plant were to be produced from this process, he said.

Plant cell lines are also patentable, he went on, since they cannot be equated with the plant itself. What is generally involved is not a vegetative propagation material in the sense of Article 5 of the UPOV agreement, since cell lines are normally not suitable for the direct production of plants.

With respect to the patentability of complete plants, Teschemacher said that the European Patent Office is not bound by Article 2, Paragraph 2 of the UPOV agreement, but rather by the Vienna Contractual Law Convention. Thus, all classes of plants are ineligible for patents. Teschemacher said that people should take a close look at whether the double protection ban can in fact be repealed, in keeping with demands coming from various quarters.

Variety and Patent Protection

Papers presented on the second day of the gathering dealt with questions of plant variety and patent protection. Prof Dr Rudolf Lukes of the University of Muenster, in his paper "The Relationship of Plant Variety Protection and Patent Protection for Biotechnological Inventions from the Point of View of the Plant Cultivator," defended the position that the extent of protection in variety protection law compared to that in patent law is limited, meaning that the degree of monopolization is lower since variety protection law is limited to the production and evaluation of propagated material. In patent law, for which a significant intellectual accomplishment is a precondition, the interests of the inventor have been considered more valuable that those of the holder of a plant variety claim, while the interests of the general public are considered much less, he said.

Lukes spoke out against the repeal of the double protection ban, saying that patent law and variety protection are contradictory in nature, meaning that granting both types of protection should not be possible. Plant varieties are not results of microbiological processes in the sense of patent law, and are thus not patentable, he added. The participants in the discussion had various approaches to the view that the present-day situation should be preserved.

Rene Royon, secretary general of the International Association of Cultivators of Vegetatively Reproducible Fruit and Decorative Plants (CIOPORA) took a different position in the speech on "Needed Protection of the Cultivators of Fruit and Decorative Plants." The cultivators of fruit and decorative plants are not adequately protected by the terms of the UPOV agreement, in particular since the classifications of the individual national variety protection laws differ significantly and often do not include the same plants, he said.

The CIOPORA demands that the protection of a certain variety in a member state be applicable in all member states of the UPOV. The variety cultivators of fruit and decorative plants do not really care here whether protection is strengthened through changes in patent law or in variety protection law.

In the opinion of Prof Dr Joseph Straus of the Max Planck Institute for Foreign and International Patent, Copyright and Competitive Law, a number of factors favor complete repeal of the exclusive provisions in patent law, declaring free competition between variety protection law and patent protection to be permissible. With plants, Straus declared, only the varieties are not eligible for patent protection, while on the other hand not only individual plants, but also genera of plants can be protected under patent law. Moreover, he said, significant discrepancies have emerged from the fact that according to Article 3, Paragraph 3 of the UPOV agreement, the member states have the option of conceding the protection contained in the agreement to other states only insofar as the latter protect the same varieties. For example, the register of species in the FRG contains 160 plants, while the lowest number is 24, in Spain.

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FRG SCIENTISTS: CONTROLLED STUDY OF HUMAN EMBRYOS INDISPENSABLE

Duesseldorf HANDELSBLATT in German 15 Apr 87 p 3

[Text] Bonn, 14 Apr (DPA)--The German Research Association (DFG) considers strictly controlled research on human embryos to be indispensable if it is done within the first 14 days after conception and can help spare many people deep suffering. This emerges from the group's official position paper on the bill on protection of the embryo introduced for debate by Minister of Justice Hans Engelhard (FDP).

As DFG president Prof Hubert Markl explained at a press conference, the general ban on the purposeful generation of embryos for research purposes provided for in the bill should permit exceptions. The position paper states that the question of whether it could be ethically justifiable to create human embryos for the purpose of using experiments on them in a guaranteed pain-free environment to gain knowledge that, in the opinion of top experts, appears to be of such a nature that it could spare many people deep suffering, "certainly demands a difficult balancing of ethical and legal aspects." The DFG supports the position of the Federal Doctors Association, which in 1986 established a central commission for granting approval for such research, whose members include, in addition to biologists and doctors, representatives of the ethical sciences and of the government as well as jurists. This board has been confronted with few cases thus far, of which "even fewer have been approved," the DFG president reported.

Both Markl and the DFG position paper assume that all relevant cases will be examined by this commission, since this type of experiment can only be undertaken by qualified professional doctors in large teams at appropriately equipped clinics. Where an experiment has not been reported, sanctions could be imposed by the competent professional association, which could range from a warning and fine to revocation of professional credentials.

Against this background, the "comprehensive application of criminal law" to the protection of embryos--as provided for in Engelhard's bill--is regarded by the research community as excessive. The DFG paper notes that the threat of up to three- or five-years' imprisonment seems excessive in particular, due in part the fact that more than 200,000 healthy fetuses are aborted each year based on an emergency situation in keeping with Paragraph 218 [of the Federal Constitution].

The DFG feels that legislation should be postponed until experience has been gathered through the central commission. An approach that is unified throughout Europe as much as possible should also be achieved, Markl said.

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FINNISH SCIENTISTS AT UPPSALA ISOLATE FROST-RESISTANT GENE

Helsinki HELSINGIN SANOMAT in Finnish 17 May 87 p B 3

[Article by Juhani Aromaki: "Million Kronor Plant Biologists"]

[Text] Professor Tapio Palva smilingly circles his display bottles at the Swedish agricultural college greenhouse in Uppsala. He knows that those insignificant-looking weed jars may contain great secrets. By discovering them one may be able to improve plants which will be able to withstand cold, salinity, aridity and other scourges better than before.

The research team led by the Professor popped the corks on the champagne bottles on 4 February 1987. It became clear on that day that the group had finally been able to separate important mutants from its experimental cress plant, arabidopsis. Simply put, they are plants in which the hereditary elements responsible for cold-resistance have changed.

"We are now the only team in the world which has these mutants. We are at the vanguard of the world in cold-resistance research," Tapio Palva smiles behind his handsome walrus mustache.

According to the Professor these mutants are important new tools in research.

"With their aid we are now able to elucidate the mechanisms of cold-resistance in plants. Right now we are identifying proteins and are about to search for genes. The mutants are an important step, but we are only in the beginning phase. There is a distance between basic research and practical applications; they are unlikely to be available for use tomorrow," he remarks.

The Professor clearly avoids speaking of his finds in capital letters, although he has just returned from a cress researchers' conference at Michigan University in the US. There nearly 300 international researchers stirred when the Professor presented the news of his team. Even the representatives of a couple of large American enterprises were immediately awake; the improvement of cold-resistance in plants could be a business activity worth millions of dollars tomorrow.

Millions Available Immediately in Sweden

Tapio Palva now circulates in his new work environment the various research exhibits, frozen plant stems and other research results which he was able to get off to a promising start during his five years in Helsinki. More than a year ago Palva left the Helsinki institute for the study of heredity, right behind the Parliament building, with six researchers and a truck for Uppsala. He is now a professor of molecular genetics at a Swedish agricultural college.

He became frustrated by having to beg uncertain research funds in Finland, by having to fight bureaucracy and all kinds of cliquism, as well as by having to constantly use his own funds to purchase scientific books at a poor university.

In Finland Tapio Palva's team disintegrated just as its research methods had been honed to razor sharpness and the time for harvest was at hand. Thus his supervisors then lamented. The Finns were a couple of years ahead of the Swedes in research, but by buying an entire team of researchers from Finland the Swedes were able to close the gap at one stroke.

Tapio Palva tells us that he now leads Europe's largest cress research team, consisting of about 20 individuals. In addition to Finns and Swedes the team also has more distant guests such as the Chinese Jianping Xin, Uruguayan Monica Mari and Argentinian Carlos Barassi. "After the move half a year was wasted in getting our affairs in order, but now everything is in good shape. Here they got the wind in their sails right away and the University invested nearly 10 million kronor in our salaries, work space, growth chambers and other devices."

Tapio Palva finds it difficult to believe that this could ever happen in Helsinki. "The University offered little else except cramped quarters and out-of-date equipment."

Sweden invests briskly in internationally "hot areas," primarily biotechnology, information technology and materials research. Uppsala is getting a large plant biotechnology center which will house 220 professors and researchers. The first phase of the construction will begin next year.

"Sweden is now investing more of its gross national product in research than the US," says the Professor.

Tapio Palva and his team also feel they are doing work that their colleagues appreciate. All the reasons for which he left for Sweden have now become reality.

"Sweden does not have dispersed location problems and Uppsala is now strongly concentrating plant biotechnology. A few years ago, practically speaking, this area hardly existed in Sweden, but now the activity is expanding rapidly," Tapio Palva tells us.

A 100 million kronor is being invested in the Uppsala genetics center, of which 60 million kronor goes for buildings and equipment. Genetics, plant improvement and forest genetics are already in existence. In addition microbiology, cell biology and forest tree cell biology institutions will be located there.

"Finland has some 20 'bush' colleges, which have to share the scanty funds scattered here and there. Results will not be generated in overly small groups without cooperation with units from other universities."

"In Finland we could never know whether we would have money after five years. And the funds were so scanty that they would not even take care of proper instruction. Now I am getting a million kronor from the University for running the institution, which I can personally divide between salaries, research expenses and trips. In addition normal grant funds are also available. Continuity is guaranteed."

"Here the instruction is specialized, and if something is taught it will also have its own funds. Professor's salaries do not differ greatly, but in Sweden the professors are freed from the onerous teaching load and administrative bureaucracy with which Finnish colleagues wrestle daily. I teach a few weeks a year, administrative leadership takes care of its own affairs. Now I can use 80 percent of my time for research."

According to him no attempt to decrease brain-drain from Finland should be made by raising professors' salaries. "The salaries are fine, but the professors should be freed from all kinds of obligations to allow them to do research. The University should create a good environment for research, prepare preconditions for research."

But at least Tapio Palva has lost his faith in the ability of Helsinki University to reform rapidly, although he has not closed off the possibility of ever returning. "It is now difficult to conceive that comparable research opportunities would open up in Finland..."

Tapio Palva is leafing through the Finnish Academy's "Development Program for Biotechnology and Molecular Biology for the Years 1988-1992."

"The program seems very preliminary, sketchy. This is only a proposal, and I suppose the funds must be obtained from somewhere. The program has again been made by the Finnish Academy and not the University itself. So much still depends on the will of those outside the University. But I am glad that something is happening in Finland," says Tapio Palva.

The Finnish program is suggesting a scant 40 million markkas in additional funds for next year's budget. It is estimated in Finland that enterprises, universities, the Finnish Academy, Sitra and Tekes use a 100 million markkas altogether for biotechnical research and product development per year.

For Over 100 Years Cold-Resistance has Only Been Described

In addition to Tapio Palva the nucleus of the Uppsala research team consists of the Finnish researchers Pekka Heino and Viola Lang, as well as the Swedish Bjorn Welin, Kerstin Nordin and Gunvor Sandman. The team is currently preparing scientific articles for international publications. Palva expects that their publications will cause a small stir and raise questions.

Palva's team began to hunt for mutants in all seriousness last summer. In January they noticed that "something new was afoot," and during February the matter was confirmed.

The world has all kinds of mutants. However, before this no one else had been able to separate mutants whose cold-resistance had changed, says the Professor.

"Because of the mutants we can now take quite a large step forward: cold-resistance of plants has been studied for over 100 years with traditional plant physiological methods and the phenomenon had been described many times, however, without getting any further."

Palva is amused that the entire building is now interested in mutants and "everyone wants to study only them." At the greenhouse he exchanges a couple of words with Bjorn Welin, who occupies himself presently with analysis of mutant hybridization.

Palva's team thus concentrates on the study of how plants withstand frost; it is a small, but significant area of specialization. "As a by-product we have obtained plant mutants which have a higher resistance to drought and salinity," he rejoices. The greenhouse table also contains jars, which help in the search for plants, which, among other things, are resistant to diseases.

"In Sweden people are interested in agriculture in which a portion of toxic materials could be replaced by improving cultivated plants to better withstand diseases. This new area is very much in right now and it also is one of our projects," the Professor tells us.

He has his own secrets and does not tell very openly about the other projects of the institution. "The stress-tolerance of plants is one problem area in which we are now working," he says.

During the next phase we will, by means of proteins, get to the genes that are responsible for the production of the proteins. There is no shortage of work; we have the mutants, we are identifying the proteins and a search for the genes has already started," Palva summarizes.

The team elucidates a model of cold-resistance by means of the cress-plant, which could later be used as a jumping-off point for transferring new traits to various plants. Gene transfer in plants is no longer a new field, it was developed five years ago already.

Researchers May Sell Findings Individually

Many consider biotechnology to be a panacea for the problems of the globe. Traditional biotechnology, the preparation of bread, cheese, clabbered milk, wine and ale, has been practiced for thousands of years. Microbes can be exploited without harming people or the environment.

The Finnish Academy has recently, amidst many misconceptions, defined biotechnology thus: Biotechnology is the application of microbiology, biochemistry, molecular biology and engineering sciences so that by means of microbes (bacteria, molds, yeasts), cultivated cells (plant and animal cells) or parts of these cells (for example enzymes) in productive activity. Biotechnology thus applies biological phenomena to technology and production.

The possibilities of biotechnology in agriculture and forestry are great. In Sweden a national biotechnology program was announced in September 1986. A rich house lives according to its means: according to the program, 250 million markkas of new money will be invested in biotechnical research per year during the next few years. Or six times as much as the Finnish Academy is proposing for next year's budget.

Tapio Palva is not yet eager to discuss the practical applications which those insignificant-looking cress jars may still produce. However, numerous objectives in plant production have been posed for solution by biotechnology.

World laboratories are striving to develop species better able to withstand plant pests and severe conditions, to improve the quality of cultivated plants, to develop cell cultivation in propagation and improvement of forest trees as well as to ward off various plant enemies from frost to pests and weeds by means of micro-organisms.

The "cold-stress" research by Palva's team is of interest at least American enterprises. Drought, salinity and frost destroy crops around the world. If researchers were able to develop hardier plants than before, the economic effects would be incalculable.

"Salinity and drought are big problems in the economy of developing countries. In the US also, especially in California and the Midwest, artificial irrigation is increasing the salinity of the soil alarmingly. Attempts are made in various places to solve these problems," tells Palva.

"Minor frosts, for example in California or Florida, can be devastating for citrus fruits. Frosts do occur even in these areas."

"Cress can survive up to ten degrees of freezing or the stress of a moderate night of frost. If we can transfer the cress genes responsible for cold-resistance into other plants, then perhaps we can find new solutions to the problems of frost susceptible areas, for example, in the cultivation of potatoes, tomatoes, cucumbers and beans."

The interest created at the Michigan conference has forced the research team to consider which results might be patentable.

"Only after we can show that we can improve the cold-resistance of plants by gene transfer will business become part of the picture. The University, however, does not set limits; the researchers are free individually to sell their potential patents to enterprises," notes Tapio Palva.

The Professor is satisfied with life; he has been provided with the conditions to concentrate on research. In Sweden. The old research surroundings at Uppsala are bubbling with new incentives and every energetic decision by the university tells how grateful the Swedish neighbors are for Finland's "brain drain."

Tapio Palva lives at the very center of Uppsala and in driving from the university campus to the center he can see a plaque on a side of the old church: "Uppsala 700 years."

That is beginning to be an age for a civilized state.

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DANISH FIRM PRODUCES GENETICALLY ENGINEERED INSULIN

Duesseldorf EUROPA CHEMIE in German No 4, 1987 p 44

[Text] The Danish firm "Novo Industri A/S" has begun to produce insulin at its Kalundborg plant using genetic engineering. In order to do so, it is using a yeast-based process that it developed on its own.

The new process is based on baker's yeast. In this medium, the pre-product for human insulin is produced. A pre-product molecule is created that contains disulfide bridges in the correct structure. The human insulin end product is produced by a single-stage, enzymatic transformation. The method avoids the extensive use of chemicals and chemical processes that is typical in the recombinant DNA method based on E.coli bacteria.

The other advantage of Novo's new procedure is that yeast is capable of cutting off protein produced using biotechnology directly into the fermentation mash, thus simplifying isolation and purification. As Novo says, the new method represents a complete biotechnological process that has never before been used for insulin production. The yeast cells produce the product continually and efficiently. The procedure begins with a simple separation of the cells from the mash without destroying the cells, so that minimal contamination of the product prior to purification is ensured.

Novo considers the procedure to be a significant improvement over the previously used E.coli method. Once isolated, the human insulin pre-product can easily be transformed into human insulin and purified.

Novo believes that the new yeast technology could make it possible to use genetic engineering to produce pharmaceuticals for various areas of therapy.

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BRIEFS

EUREKA: MONTEDISON PROJECTS--The Montedison Group is involved in two of the 37 projects approved in Stockholm on 17 December within the framework of the European research initiative Eureka. The parent company of the Italian chemicals concern itself is covering one-fourth of the costs of the project known as "Laser Technology for Destroying Chemical Substances and Residues," which comes to a total of nine million ECU; it is cooperating in this with France, Belgium and the Netherlands. The pharmaceuticals branch of the group, "Farmitalia-Carlo Erba SpA" is covering half of the costs of 14.7 million ECU for the project "Development of Membranes for Biological Separation of Fermentation Products." Its partner here is France. [Text] [Duesseldorf CHEMISCHE INDUSTRIE in German No 2, 1987 p 78] 12271

ITALY-INDIA GENETIC ENGINEERING PROJECT--Three assistance agreements are intended to encourage the work of the International Center for Genetic Engineering and Biotechnology (ICGEB). Two of these agreements, signed by the general director of the United Nations Industrial Development Organization (UNIDO), Domingo L. Siazon Jr., and the Italian ambassador and permanent representative, Mario Alessi, relate to the centers in New Delhi and Trieste, while the third covers general terms. The first assistance agreement deals with the appropriation of $11.2 million by Italy for the work of the branch center in New Delhi. This money will cover part of the personnel costs, as well as expenditures for training, support of cooperating institutes, guest researchers, conferences for specialists and scientific consultation and research in New Delhi itself. The second agreement relates to the appropriation of $7 million for personnel expenses, research expenditures and equipment for the branch research center in Trieste. Another $2 million is added to this in cash. The general agreement between the Italian government and UNIDO applies to the implementation of the Trieste project, to privileges and immunity provisions for workers and to plant and lab facilities. [Text] [Duesseldorf CHEMISCHE INDUSTRIE in German No 2, 1987 p 78] 12271

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AUTONOMOUS MOBILE ROBOT PROJECTS IN FRANCE, FRG

Bern TECHNISCHE RUNDSCHAU in German 27 Mar 87 p 130

[Excerpts] Hilare

The Hilare project began in 1977 at the LAAS (Automation and Systems Analysis Laboratory) in Toulouse (28).

Locomotion: Three-wheeled carriage with two driving wheels.

Sensor system: 17 ultrasonic sensors for measuring close-range distances and for obstacle recognition. A combined camera-laser-scan system is used for three-dimensional viewing.

Planning and monitoring: Modules for planning, for control analysis and for navigation, for movement control and for natural-speech communication comprise the most important units of the control hierarchy. Aside from the movement control, these modules are automation-based. All modules have special communication interfaces. Environmental modulation and path determination take place in a topological and a geometric plane.

Vesa

The Vesa project (28) began in 1978 at the LATA (Applications of Advanced Technologies Laboratory) in Rennes. Its goal is to build a fully autonomous, mobile robot that can function in a real production environment.

Locomotion: Two passive wheels and two drive wheels.

Sensor system: Laser triangulation system, an infrared triangulation system and a pressure sensor that can sample the robot environment in order to detect obstacles.

Planning and monitoring: A global plan specifies the route. Locally, the path is determined using a special search algorithm. On-line control is conducted using the feedback from the triangulation systems.

Microbe

Since 1979, the Microbe experimental autonomous system has been under development at the Chair for Control System Technology of the Technical University of Munich (65). Its goal is to resolve the practical applicability of sensor- and knowledge-controlled methods for autonomously conducting transportation functions.

Locomotion: Four-wheeled carriage with two pulse motor-driven wheels and two support rollers.

Sensory system: Ultrasonic sensor for measuring distance and an infrared communications unit.

Planning and monitoring: Route planning takes place by way of a grid map that is generated using the ultrasound sensor. The knowledge used has four components: geometric environmental model, navigable network, vehicle model and behavioral rules. Monitoring in local plan implementation is based on the ultrasound system and is capable of evading new obstacles.

Mobile Robot

Since 1985, an autonomous mobile robot has been under development at the Chair for Process Control Computers at the University of Karlsruhe that is to be used for transport (e.g., retrieving parts from storage) and assembly work (22, 66). It is equipped with two arms (Puma 260) that are mounted transversely.

Locomotion: Four-wheeled carriage, in which each wheel is driven separately and has diagonally positioned rollers, so that any position can be assumed from a standing position.

Sensory system: One camera for two-dimensional parts identification (above the assembly table) and two hand cameras for operation-supported three-dimensional viewing. An ultrasound sensor and a separately developed laser scanner are to be incorporated in the future for obstacle detection and navigation.

Planning and monitoring: The planning activities (both global and local) relate to path finding and obstacle avoidance as well as to the transmission of assembly instructions through assembly graphics, the sensors needed for this task (measurement regulations) and the resources needed for this task (e.g., left or right arm). The executive program assumes local part planning and cooperates closely with sensor processing in monitoring the individual robot actions. The executive program and the sensor module are implemented as blackboard systems that are coupled very closely through special communication interfaces. The norms for measurement regulations and robot actions are realized as knowledge sources.

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SWEDEN: ASEA CHIEF ON FIRM'S DECENTRALIZATION, SUCCESS

Duesseldorf HANDELSBLATT in German 18 May 87 p 30

[Article by Udo Rettberg: "Europe's 'King of the Robots' Does Not Stop to Draw Breath"]

[Text] "We are concentrating our strength on those business areas that we think we know something about and in which we are successful," is how Percy Barnevik, chairman of the board and president of Asea AB in Västerås, characterizes the strategy of his broadly diversified electronics company.

"Our strategy is aimed at finding niches in world markets in business areas in which we are active. Through carefully directed research and development work we intend to be number one in the world in these areas, or at least to occupy a leading position," is Barnevik's concrete statement.

In a conversation with the HANDELSBLATT, Barnevik attributes the success of Asea AB (Allmänna Svenska Elektriska Aktiebolaget) to a fundamental change in business policy that was initiated in 1981. At the time Asea was largely centrally managed, unwieldy company. A top-heavy administration, with more than 1,500 employees at company headquarters in Västerås, made flexible, market-oriented decisions difficult.

But that has changed radically. The search for market proximity, the international decentralization of the company, directed expansion through takeovers, the tracking down of business opportunties, the exploitation of all resources at home and abroad and, above all, profit-oriented thinking--this was the plan drawn up in 1980.

The plan worked perfectly; today the firm is among the market leaders worldwide in the areas of generating stations, energy technology, energy production, energy transmission, industrial equipment (robots) and financial services. Today, Asea appears as a company bursting with financial good health.

In Barnevik's view, the strong international decentralization of his company is one of the quite crucial points in Asea's success. "If we want to market a product abroad, it is our feeling that we should also be represented there. Almost 80 percent of sales are achieved abroad.

The company, which is known as "Europe's king of the robots," is a technological leader in numerous fields. However, at present the company is being forced to slow down in the once shining area of power plants; the order books in this area, formerly bulging, are now empty. The president sees particularly good opportunities for his company in rail traffic. To this newspaper, Barnevik speaks of imminent "glorious times" for his company in this area.

The company underwent considerable expansion in the past as the result of a closely directed takeover policy. Asea astonished everyone last year with a takeover of the Finnish Stromberg group. This is in accord with Barnevik's plan; he regards the entire Nordic area as Asea's "domestic market."

Worldwide, Asea has more than 246 subsidiaries, employing 71,000 workers. According to Barnevik, sales rose from 40.1 billion Swedish kronor in 1985 to 46 billion kronor last year. Profits after special items, reserves and taxes rose slightly from 2.47 billion kronor to 2.527 kronor.

Using the securities balancing method, profit per share after paying taxes came to 37 kronor in 1986, compared with 36.60. The Asea board chairman puts net profit--after deducting the standard 50-percent tax--at 20.50 kronor, compared with 20.20 kronor.

Barnevik is cautiously optimistic for the current year. "We are trying to maintain last year's profits." Company stock is being traded in Helsinki and London, as well as on the home stock exchange in Stockholm, in free trade in FRG and on the Nasdaq over-the-counter market in the United States. Barnevik is not currently seeking an official note in Frankfurt. Plans for a visit to the stock exchanges in Oslo and Copenhagen are to be carried out soon.

9581
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EUROPEAN MEGACHIP TECHNOLOGY ECONOMICS, FEASIBILITIES

Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 24 Mar 87 p 5

[Article by Hans Juergen Tkocz: "Can Megachip Technology Ever Be Economical? European Companies Have Difficulty In Terms of Cooperation on Development"]

[Text] Frankfurt--The game of catch-up being played by European chip manufacturers with regard to the overly powerful competition in the United States and Japan appears to be showing the first signs of success. The progress of Siemens in the development of the four-megabit chips points in this direction. As the physical and technical limits of miniaturization are approached, the ever more urgent question is whether excessive increases in the cost of further progress cast doubt on the economic feasibility of mega and submicron projects. While production of the one-megabit chip has gotten underway and the four-megabit chip is devouring huge development costs, the leading semiconductor manufacturers are simultaneously performing the preliminary work on additional electronic elements which, according to current levels of expertise, will not be ready for series production until the end of the 1990's at the earliest.

From a technical point of view, the 64-megabit memory is considered today to be feasible. Doubt is being expressed, however, as to whether such products are still economical given the ever shorter product cycle and the associated demand for ever more frequent innovations. The price of chips has always fallen drastically shortly after being introduced on the market. The megachip plant of Siemens AG in Regensburg, including the infrastructure, has cost DM 540 million up to now. Further expansion will consume another DM 2 million in investments. This figure does not even include expenses for research and development.

Against this background, many of the speakers at the technical conference on large-scale integration of the VDE/VDI (Association of German Electrical and Electronics Engineers/Association of German Engineers) microelectronics group in Baden Baden were heard to express doubt about profitability. In contrast to this view was the objection that the "mega" logic was not an end it itself but rather a key factor for providing technological incentives to more and more areas of the national economy in the high-tech race taking place in the entire microelectronics field. This is true in particular for the branches of

German industry with a large percentage of exports which are exposed to keen international competition, such as machine construction, machine tool construction, precision mechanics/optics, office automation and data processing.

In this regard, the European market volume for integrated circuits, which is actually very small compared to the United States and Japan, proves to be an obstacle. Within the past year Japan accounted for more than 47 percent of world-wide chip sales and the United States accounted for 40 percent, while the European market accounted for just over 10 percent. In the opinion of observers of this field, there will therefore be an increased demand upon the Europeans for greater cooperation with one another, but also with the Japanese who lead the field in consumer chips and with the American electronics firms who lead the field in microprocessor technology. Five out of ten of the largest European electronics firms alone have no in-house production of integrated circuits and are thus dependent to a greater degree on the supply situation and prices on the international market.

Mutual cooperation among the Europeans has been difficult up to now for two reasons. For one, none of the larger industrial nations wants to compromise its own technical expertise in this key technology. And for another, the manufacturers who are at the forefront in terms of research and development want to reap the fruits of their large investments themselves. Due not least of all to this attitude the EC commission has made its financial support for microelectronics dependent on at least two companies from two different member nations working together. Independent marketing is still ensured, as the division of labor by Philips and Siemens shows, where Siemens concentrates on the DRAM and Philips on the SRAM 4-megabit chip.

At the end of last year in Stockholm, the EC nations participating in the Eureka program agreed upon a comparable European research program for a heretofore non-existent memory group. The first phase of a joint project between Thomson Semiconducteurs (France) and SGS (Italy) for highly complex, electrically erasable EPROMs using 0.8 micrometer CMOS technology is being supported within this framework. The cost to each of the two partners is estimated at about DM 400 million. Thomson Semiconducteurs and SGS are the only European manufacturers of EPROMs. Here, too, the international market is dominated by Japanese and American firms to the tune of around $850 million (1985).

Given this situation, it is assumed that Thomson and SGS will want to work more closely together. There is talk in Italian newspaper articles of plans to establish a joint venture in which the two partners will participate with 40 percent each, while the remainder would be open to a third partner. The negotiations are currently revolving around the question of which side will hold the top management positions within the joint venture. And finally, the French firm Matra, which is associated with the American firm Harris in a joint venture with equal participation by both companies, also has plans to cooperate in the area of semiconductors with the Swedish firm Ericsson in case the Ericsson group is awarded the contract for 20 percent participation in the French national telephone company CGCT; Siemens is also bidding for this contract.

The inclination for each of the EC nations to go its own way still remains unchanged, as evidenced by the embargo by the three major member nations, the FRG, France and Great Britain, of the EC master program for research and development for the 1987-1991 five-year period. This jeopardizes follow-up financing for the Esprit (Phase II) and Race programs. The EC commissioner in charge of research, Karl-Heinz Narjes pointed out in Baden Baden that the EC's planned subsidy for microelectronics for the five-year period up to 1991, at 7.7 billion ECUs, is exactly as much as the EC spends on agriculture in one quarter.

12552
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BRIEFS

ES2 PLANT BUILT IN FRANCE--European Silicon Structures (ES2) has laid the cornerstone to its European plant in Rousset, in the French department of Bouche-du-Rhone, 17 km east of Aix-en-Provence. It is expected that this plant for the production of application-specific integrated circuits will go into operation in the summer of 1987. The new production complex, with a surface area of 20,000 square meters, will employ 300 people, including 150 engineers. The new plant will be the first European semiconductor production complex in which the electron-beam lithography process will be used for commercial production of integrated circuits. The stockholders in ES2 include British Aerospace (Great Britain), Brown Boveri (Switzerland), Bull (France), Olivetti (Italy), Philips (the Netherlands), Saab Scania Combitec (Sweden), Telefoncia (Spain) and Telfin (Belgium). The ES2 branch for Central Europe is located in Germering, near Munich. [Text] [Stuttgart ELEKTRONIK INFORMATIONEN in German No 1, 87 p 80] 12271

EC SUPPORTS MEGACHIP PROJECT--Brussels (P)--The EC commission has approved state support for the megachip project planned by Philips in Hamburg. The Hanse city of Hamburg will thus participate in the DM 500 million project with DM 100 million. Furthermore, it has been said that similar decisions are also expected for other locations which have been included in the development project by Philips. The green light from Brussels means the third stage in the joint program by Philips and Siemens to develop memories with a capacity of more than one megabit. [Text] [Landsberg PRODUCTION in German 2 Apr 87 p 1] 12552

CSO: 3698/393

RIESENHUBER ASSESSES 13 MAJOR FRG RESEARCH FACILITIES

Duesseldorf VDI NACHRICHTEN in German 20 Mar 87 p 15

[Text] The large research institutions are still in a transitional phase that is gradually drawing to a close. After describing the individual large-scale research institutes over the past months in the VDI NACHRICHTEN, in this final article Federal Research Minister Heinz Riesenhuber outlines the objectives and premises of the work of the thirteen large research institutions.

A majority of the large research centers is now much more than a quarter of a century old. The great tasks of the era of their establishment have now been fairly well worked out. Nuclear technology was one important area. In this area, tasks were either stopped, because for economic considerations it was not possible to introduce them into the market, as for example in the case of nuclear ship power, or, and this is the rule--tasks could not and cannot be handed over to industry in keeping with objectives. Other areas of the early phase, such as aeronautics and space flight, have once again taken on great significance after a period of relative inactivity. Other topics of no less importance have been added: cancer research, environmental research, environmental protection, polar research and biotechnology.

Other centers, particularly those which are predominantly active in basic research, have retained their fields of interest thematically and outwardly, to be sure, but they have continued to expand their research and as a result of new and powerful devices they have moved ahead to ever greater dimensions of knowledge. The major investment decisions must also be seen in the light of the important scientific successes and the international reputation of these centers: decisions which have been made over the past four years, such as that in favor of DESY in Hamburg with the large HERA cyclotron, the heavy ion accelerator SIS for the Society for Heavy Ion Research in Darmstadt and the large-scale experiment of ASDEX upgrade for the Max Planck Institute for Plasma Physics in Garching.

As a result of developments in recent years, today we can distinguish four major areas in the research profile of the large-scale research institutions:

First, there is the basic research which is carried out by means of large devices. HERA and SIS have already been mentioned, but the expansion of the

Berlin BER II reactor at the Hahn-Meitner Institute and the new cooler synchrotron COSY of the KFA in Juelich should also be included here. These new large devices, typical for large-scale research centers, are intended to provide outstanding researchers at the universities and the centers themselves with an opportunity to pursue their scientific inquiry at the highest levels. In this regard, the expansion of the high-performance computer center in Juelich, which the KFA intends to operate together with the Society for Mathematics and Data Processing (GMD) and DESY, is also very interesting. This cooperation across institutional boundaries with regard to a target-oriented action in the development of new research possibilities I consider to be an extraordinarily promising approach which will open up new dimensions for large-scale research. The investments required for these new devices are very costly because of the nature of the facilities. Because of this, the devices approach the limits of what is possible today not only in technical terms, but they also stretch the financial limitations to which public budgets are subject. In order to avoid shortages here, care was taken in the case of HERA to woo appropriate international participation, an approach which met with very impressive success.

Because of the high expenditures needed for large-scale devices, the financial percentage of the related research accounts at the present time for 30 percent of the total budgets of all thirteen of the large research institutions. This percentage will decline, to be sure, as the projects near completion; however, in the longer run it could still constitute 25 percent.

In the future as well, basic research using large devices will therefore remain a cornerstone of the overall development design of the large-scale research institutions. The centers have here a recognized and necessary niche in our research landscape.

In Terms of Funding, Large-Scale Research is a No-Growth Area

Another important area in the overall profile of the large research institutions is represented by long-term government programs such as oceanographic and polar research, space research and the utilization of controlled nuclear fusion. The large research centers are particularly well suited to devote their attention to these topics. This was among the reasons for the establishment of the newest facility, the Alfred Wegener Institute (AWI) in Bremerhaven.

The present significance of aerospace research need not be further elaborated in this regard. The importance that the German Research and Testing Laboratory for Aeronautics and Astronautics (DFVLR) plays in this regard was underscored by the D1 mission. With the expansion of the European space program and the decisions, some of which are quite complex, which confront us at the present time, the DFVLR will be confronted with additional and very challenging tasks. For we find ourselves confronted with a difficult situation, i.e. that given the financial and personal resources that are available to us, it is almost necessary to play a kind of no-score game. If one area is to grow, then another must necessarily receive less priority.

This is especially true within a facility, when new topics are to be addressed or when, as in space research, existing approaches are being and need to be expanded.

The DFVLR is not alone in facing this problem. The other large-scale research institutions as well also find themselves in this difficult situation, since almost all are undergoing a reorientation. It is not so much the limited financial resources that pose problems here, but rather it is the personnel capacities which lead to serious bottlenecks in view of stagnating hiring policies. The continually rising average age of employees, a result of this stagnation, also causes me serious concern. In order to preserve our creativity into the 1990's or if possible even to increase it, a possibility must be created at the present time for young scientists to join the centers. In recent years, several such opportunities have been created. I would like to cite one program in particular, which provides a limited number of outstanding scientists with an opportunity (by anticipating the predictable retirement of older employees) to join one of the large-scale research institutions. I hope that it will be possible to continue this program in the coming years and thereby to continue this ongoing rejuvenation process.

A third very important area for major research includes all those themes which can be linked together under the concepts of "bettering living conditions and human services research." These include environmental and climate research, health, security technologies and environmental technologies. These areas represent a future growth field for the large research institutions. Some of these topics are particularly well-suited for individual institutions. Here I am thinking of ecological research, climatology and health research. Larger interrelated and complex topics must be studied, the scope of which surpasses the resources of our universities, which are making great strides forward in this regard.

The increase in this new type of large-scale research, which I might describe as "soft projects," signifies a profound transformation in the traditional structure of major research. If in the past, research was characterized especially by the development of large technological systems and by the same token by objectives which could be defined fairly precisely, the new type of large-scale research or the study of large, complex systems with a broad range of scientific disciplines can only in very few cases from the beginning have clearly defined objectives as well as cost and time projections, as is the case with technological projects. Here this type of research resembles basic research, although it differs from the latter in that it is aimed at the practical application of research results and at answering questions of importance to society, and to this extent provides bases for strategies of action.

Management problems are brought to the centers through this relatively new form of research, the solution of which, as initial experience has shown, will not be simple and for which at the present time there is no prevailing consensus. The large research institutions are therefore confronted here with a challenge of extraordinary importance for their future. It is important for them to succeed in addressing and dealing with the new "soft projects" with the same efficiency that previously characterized more classical domains. If

they do not succeed in this, a question which must be watched very closely over the coming years, there is certainly a serious question regarding the continued existence of some of our large-scale research institutions. It cannot be permitted that, in the case of some of the most important question that are posed to research at the present time, the large research institutions, given their potential, fail to do their part to contributing to provide effective and convincing solutions.

Large-Scale Research, Industry and Universities Must Work Together

In this context it is important that the large research institutions do not stand alone here. The universities were already mentioned. But there are many other institutions, federal and stage agencies, which should work together with the large research institutions. The problems are in part so large and so complex that institutional boundaries must be overcome. It is important that the institutions move closer to each other than has previously been the case.

The last and largest segment accounting for 30 percent of the total profile of the large research institutions is research related to the economy. Of this, nuclear technology accounts for the largest share, despite sizable reductions; focal areas are the disposal of nuclear waste and the development of progressive, long-term systems. In the latter area, stress is being increasingly placed on security considerations, since without satisfactory and convincing answers to such questions the utilization of nuclear technology is not possible.

The total area of economy-related research will be reduced in the longer run in relation to the overall dimensions of the large research centers. There are two reasons for this: on the one hand, the areas mentioned previously, in particular the long term government programs and human services research, are expected to increase in scope, and, on the other hand, it has been possible to turn over classic areas such as nuclear technology, mentioned above, to industry.

The freeing-up of such areas alone has made it possible to modify the tasks set the large research centers, and to orient these tasks to future needs.

The coming years will see a considerable thematic change in the share of research that is related to the economy. Here, too, the large research institutions will take up the challenge of the future in those areas where good and productive approaches already exist. As key words we might mention here biotechnology, materials research, information technology, microstructures and manipulation technology, underwater technology and new methods and technologies for space flight. The role of the centers is predominantly in the area of preliminary research that paves the way for industrial development. In order to avoid the danger of circumventing what is actually needed, however, partnership with the private sector must be sought at as early a stage as possible. This was also true in earlier times, but today this partnership must be extended to include new areas as well, although approaches such as those found in underwater technology and microstructure technology are certainly already available.

Nonetheless, it is clear that for the sector of business-related research the relationship between large-scale research and industry has not yet again regained the intensity that it once had and that would be desirable. Both partners should approach closer to each other in the near future.

Because of the special nature of this research, the usefulness and importance of the large-scale research institutions for the economy are centered in just a few specific fields. However, this research should and must demonstrate its efficacy in these fields.

12792
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FRG MINISTER ON R&D, EDUCATION, PUBLIC FUNDING, POLICY

Duesseldorf VDI NACHRICHTEN in German 27 Mar 87 p 51

[Text] Traditional strengths should not be neglected, as they represent a competitive edge for the future! This is not only the motto for those industries which participate in the Hannover Fair, the classical German export fair. Federal Research Minister Dr Heinz Riesenhuber, whose orientation is appropriately forward-looking, believes this as well. But, he believes, the state can only do what is in its power in this regard. "A necessary but not adequate sufficient condition for a reasonable and healthy development," says Minister Riesenhuber. Does business regard research and development as its own special domain? The Hannover Fair is one of the places where new answers to this question are constantly sought within an international framework.

In our culture, knowledge determines not only our views concerning nature and the development of technology, but also in a profound way our dealings with each other in society: when we are forced to decide between two different avenues of approach, when we wish to form a united front for joint objectives, then the issue of what we know or think we know is in the foreground.

Whatever is the better, the more correct arguments should then win the day, not the opinion of whomever happens at the moment to possess more money or power. This view is reflected in many different forms within the modern state of law.

The encouragement and support of the expansion of knowledge through research is a primary objective of research policy. In addition to this, there are two further goals:

-the expansion of opportunities for human beings to act and to have a conservator relationship with the natural world;

-an efficient research landscape as a precondition for a competitive economy.

This does not automatically imply that the state is called upon whenever research is to be facilitated. Research and development in the FRG are not subsidized and operated from one central office, but are rather divided up, in accordance with constitutional requirements and public order, among duties of the private and public sectors and of federal, state and private sponsors. To

be sure, at the beginning of the 1980's we witnessed a questionable development in which the state's contributions to the financing of research grew disproportionately as private initiative declined.

The focal point of the new challenges in the business sector has been and continues to be found in the areas of the modern key technologies such as biotechnology, information technology, manufacturing technology and materials research. In recent years, a reorientation has taken place both in government support for research as well as and particularly in the private sector. German businesses have taken up the technological challenge.

Between 1982 and 1986, the private sector increased its spending for research and development by one/third. These efforts were based on traditional strengths and new technological solutions were successfully developed. The percentage of research and development financed by businesses themselves has clearly risen once again. With this figure currently at 60 percent, we are now, after Japan, ahead of all other large industrial nations.

By the same token, it was possible to significantly reduce state support of market-oriented technologies, from more than 53 percent of the budget of the Ministry for Research and Technology in 1981 to a projected 43.3 percent in 1987.

Nonetheless, in the face of declining funding for economic assistance, a thematically new orientation of research support was undertaken. New, innovative fields such as information and biotechnology are in the foreground of research funding, although this funding has declined in overall terms.

In this regard, the principle holds true that the more market-oriented the research and development projects are, the less the influence of the state. This is reflected in the greater importance of indirect instruments of support as well as in the greater involvement of mid-sized businesses.

Between 1982 and 1987, BMFT [Federal Ministry for Research and Technology] funding for indirect and indirect-specific measures increased almost 400 percent. The relative importance of direct support measures for the private sector from federal funds was greatly reduced thereby. If in 1982 the ratio of direct to indirect support was 4.7:1, in 1985 this figure was 2.3:1--with an overall drop in funding for research in the private sector.

With this trend and with new approaches such as the assistance programs for increasing the staff sizes of small and mid-sized businesses, the expansion of allied and contract research, the federal government has done its part to allow dynamic forces to be felt particularly in mid-sized businesses. In overall terms, for every mark spent by small and mid-sized businesses for research and development, significantly more funding is available than is the case for large companies.

Mid-sized businesses, which finance approximately 18 percent of research expenditures coming from the private sector as a whole, today receive approximately 25-29 percent of state research funding.

Research policy has taken advantage of the recovered latitude resulting from the limiting of private sector support in two ways:

-by funding basic research and research in the are of human services;

-by improving cooperation and the transfer of know-how between the scientific community and the private sector.

These do not always have to mean the allocation of new research funds. Financial support for research is, to be sure, an important component, but it does not comprise the totality of research policy. Other, non-monetary components are at least as important, including simplification of management, management of state-run large-scale research institutions, maintenance of a climate that supports and stimulates research and mediation between the scientific community and the public, so that problems can be discussed in an objective way and prejudices eliminated.

Various instruments have been developed in order to speed up the transfer of new scientific knowledge to practical applications. Three examples:

Since 1985, the BMFT has been supporting the limited assigning of young scientists from private industry to research facilities through the new instrument of research cooperation.

The experimental model "Establishment of Technology-Oriented Businesses" is intended to minimize market obstacles for innovative new companies and thereby to help new research-based ideas to be accepted in the marketplace. The large-scale research institutions which have united in the AGF have turned their attention increasingly to the task of technology transfer. The Max Planck Society as well is intensively concerned with the transfer of knowledge and technology from its research institutes.

Research, science and technology cannot be understood when research freedom and applicability are regarded as antagonistic. Basic research, applied research and technological development mutually influence each other.

Here in Germany there is at times a tendency to see a contradiction between independent and dependent research. For two reasons, I regard a strict division between the two worlds, between pure basic research and applied research, if such a distinction was ever useful, today as unproductive: instead of a sequential development, today it is possible to speak in many areas of ongoing reciprocity. This is true, for example, in the case of new instruments and devices. Here technologies originally developed for concrete applications were taken up by basic research, utilized and further developed in a way which also advances technology for everyday use and for production. We see this development in the case of electronic data processing as well as in high energy physics.

The same is also true for knowledge stemming from basic research. The research results of Klaus von Klitzing, which were of direct benefit for the

development of semiconductors, are here an example, just as are the still very new insights in virology, which are being rapidly applied to the development of new medications.

In the area of biotechnology, almost every month there is a new example of how the distance between basic research and technological applications is shrinking.

There are those who say that this gap in individual cases is only as long as the lunch break, because in the morning researchers are in the institutes and in the afternoon they work in a business firm on transferring the results of their research.

In view of these developments, we must take care not to squander important opportunities by adhering to false and unnecessarily rigid categories. We still need what I like to describe as a more knowledge-oriented basic research, and what I also like to describe as a more applications-oriented basic research. But above all we need collaboration between both and we need no artificial barriers between them. We need a rapid application of new knowledge for processes and products.

On the world market, where we earn approximately one-third of our national product, an ever-increasing percentage of sales is accounted for by very new and very demanding technologies. For this reason, in the past as well we were only partially successful in individual fields in keeping pace with the world market, because here at home it was not possible to apply the results of excellent basic research in terms of innovations as rapidly as was done in several other countries with whom we are in competition.

In this dialogue, no side should be overlooked. I am aware that science can only be a cooperative partner for applied research when from its own strengths it is capable of outstanding accomplishments. We are not trying to place one ahead of the other, a view reflected as well in our ongoing support for new working possibilities for knowledge-oriented basic research, for which the BMFT today provides a good third of its financing.

We must continue to pursue the course that we have undertaken of recognition for top accomplishments, of reducing unnecessary bureaucracy and of establishing priorities in research. In the coming years, particular attention will be paid to university research--as a major pillar of basic research in Germany--and to the question of the opportunities that are available for young scientists.

The need for health, security and a livable environment is preeminent in the value scale of human beings. Research which serves these objectives is only in part supported by free market forces. In these fields there are important tasks for research policy, which were taken up in past years, some of them for the first time, and moved ahead considerably. Funding for these objectives has been significantly increased. Research related to health, the environment, climate and the humanizing of the workplace are examples of such tasks.

The greatest potential for solving the tasks of the future is to be found in new knowledge and new technological solutions. In many cases, basic studies must still be carried out here, for example in climate research and aids research.

The importance of human services among the tasks of the BMFT will therefore continue to increase over the coming years. In many cases, however, solutions have already been worked out which are now being applied in stages, for example in environmental technology and the humanizing of work. Completely new themes will be added, research tasks which could result from demographic changes, for example, or from the ongoing and increasing international cooperation in the area of environmental research.

The increased restraint in market-oriented areas has made possible the necessary expansion in aerospace research. This research field offers promising future prospects for basic research, industrial applications (today already in the area of telecommunications), human services (climate research, environmental observations) and international cooperation.

12792
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FRG-USSR: JOINT VENTURES, NUCLEAR SAFETY, AGRICULTURAL RESEARCH

Already 250 License Agreements

Duesseldorf VDI NACHRICHTEN in German 17 Apr 87 p 6

[Article by Michael Peter: "German-Soviet Trade Relations Are to Be Intensified: The Market for Machines and Fashion, for Nuclear Technology and Cranes, Is Open: A Total of More Than 250 Licensing Agreements Are in Effect"]

[Excerpts] Bonn, 17 Apr (VDI-N)--The press conference held at the conclusion of the 15th conference of the German-Soviet Economic Commission was not exactly a sign of glasnost, the policy of openness promulgated by Gorbachev. On the contrary. Deputy Chairman of USSR Council of Ministers Alexey Antonov even went so far as to thank FRG Minister for Economics Martin Bangemann (FDP) for not naming the three or four companies that are trying to supply a renewed boost to economic relations through joint ventures.

This is something in which both parties are interested, since the volume of trade decreased in 1986 by more than 20 percent to DM 18.7 billion. Bangemann issued a warning against drawing false conclusions: The basis of this must be assumed to be not a decline in quantity, but rather a drop caused by falling oil and natural gas prices. In view of current economic trends, it is patently obvious that the Germans "naturally want further development of exports."

But the Soviets are also interested in averting a further decline in trade relations. The success or failure of the policy of reforms that has been introduced ultimately depends on economic prosperity. And in order to hurry this along, the Council of Ministers has approved by decree joint ventures with "companies in capitalist states." Moreover, the foreign trade monopoly has been expanded to include around 40 enterprises and 20 ministries, which are now allowed to conclude export and import agreements directly. In Bonn, Antonov said that Moscow is drawing up an investment guaranty agreement in order to ensure the retransfer of investments even when a project fails. This is of particular importance to smaller and medium-sized companies in the West, who cannot afford bad experiences. However, this does not mean that all obstacles have been eliminated for them. Trade with them cannot be set up as barter transactions, since they would in that case "almost by necessity fail,"

Bangemann said. The reason is that the companies would not be able to market the goods offered them for bartering.

The minister for economics put forth a very pragmatic proposal to the effect that those firms that are already involved in some sort of cooperation with the Soviets should show the greatest amount of interest in the joint ventures. Just by following Antonov's route in the FRG, it was possible to tell which companies that means.

Joint Development of a Reactor

Immediately after visiting the Salamander shoe factory, Antonov went to the Ehingen plant of Liebherr AG, where mobile cranes are produced. In 1982, Liebherr delivered 300 self-propelling cranes to the Russians and has already made a great deal of progress in negotiations on a joint venture.

However, a real news scoop was provided by a German development consortium. While Antonov and Bangemann were being very cautious towards the press about the joint development of a high-temperature reactor, an announcement from the consortium, led by Innotec Energietechnik in Essen was coming across the news wires: An agreement had been reached with the State Committee for the Use of Atomic Energy on cooperation in the development, construction and use of high-temperature reactors with a capacity of 100 megawatts (HTR 100). Negotiations on all contracts concerning deliveries, technology transfer and financing are to take place in the year and a half ahead, "until they are ready to be signed."

COCOM List Should Not Interfere With Reactor Safety

The consortium, an amalgamation of BBC in Mannheim, Hochtemperatur-Reaktorbau in Dortmund, Babcock Maschinenbau in Ratingen, Strabag Bau in Cologne, Mannesmann Anlagenbau in Duesseldorf and Innotec Energietechnik, estimates the size of "a first joint construction project" at DM one billion. The detour via joint development must be taken in order to avoid violating the COCOM agreements, which restrict trade in modern technologies. Bangemann stressed that the West German government has always been committed to the ideal that the limits on non-deliverable goods should be drawn very narrowly. And, he said, safety elements cannot be excluded from trade concerning nuclear power.

The COCOM restrictions are naturally a thorn in the Soviets' side. They want only the most recent technology; they have no interest in secondhand equipment, the department leader in the Ministry of Foreign Affairs responsible for the West, Vitaliy Masterkov, said. This is understandable in view of the targeted growth rate in engineering; this rate is to be increased one and one-half to two times over in the next 5 years. The goal and the dream of the Russians, or at least of Konstantin Frolov, vice president of the Academy of Sciences, is the "deserted factory." Numerically controlled machine tools and measuring machines, as well as industrial robots, are intended to relieve people of difficult and monotonous work in the farmers' and workers' state.

Otto Wolf von Amerongen has put his finger on one point associated with this. New technologies and forms of cooperation also place new demands on management and enterprise leaders in the East. For this reason, the chairman of the Eastern Committee of the German Economy and member of the German-Soviet Economic Commission says that cooperation must also take place in the sphere of job training and re-training.

However, this was not addressed in the commission's joint communique. Impetus was given to scientific and technological cooperation, and interdepartmental agreements on agricultural research, on peaceful uses of nuclear energy, on medicine and on health care were initialed. An agreement had already been reached on environmental protection, including an exchange of scientists and the participation of Berlin.

If German-Soviet trade is approached in terms of numbers, the following picture emerges: Last year, goods ranging from lathes to ready-mixed concrete mixers to tennis shoes were exchanged by way of more than 20 cooperative agreements. Nine Soviet enterprises made contact with the German market by way of stockholdings. A total of more than 250 licensing agreements are in force.

Agricultural R&D Collaboration

Hamburg DPA in German 1119 GMT 4 May 87

[Excerpts] Bonn (DPA/VWD)--A German-Soviet agreement on agricultural research was signed in Bonn on Monday by Agriculture Minister Ignaz Kiechle (CSU) and Vsevolod S. Murakhovskiy, his Soviet counterpart, first deputy chairman of the USSR Council of Ministers and chairman of the USSR State Agro-Industrial Committee. This agreement provides for the exchange of research results, scientists and biological materials, as well as joint scientific projects.

At the signing of the agricultural agreement, Murakhovskiy stressed its importance for bilateral cooperation and referred to the planned intensification of agricultural production in the USSR in the coming years. According to him, by 1990 the Soviet Union will be independent of cereal imports from the West, as a result of increased use of mineral fertilizers and plant protection methods.

12271
CSO: 3698/428

FRG-USSR COOPERATION: RESEARCH INTENSIVE JOINT VENTURES

Nuclear Energy Cooperation

Duesseldorf VDI NACHRICHTEN in German 1 May 87 p 1

[Text] Bonn, 1 May (VDI-N)--Scientific and technical cooperation between the FRG and the USSR has made a decisive step forward. On 22 and 23 April, FRG Minister of Research and Technology Dr Heinz Riesenhuber and FRG Minister of Youth, Family and Health Dr Rita Suessmuth signed interdepartmental agreements in Moscow in the areas of nuclear energy and health care. The framework for these agreements is the July 1986 German-Soviet government agreement on scientific and technical cooperation.

Accompanying the interdepartmental agreements, the German consortium HTR 100 and the Soviet State Committee for Atomic Energy signed a contract at the beginning of April dealing with the development of small high-temperature reactors. Besides establishing 10 initial German-Soviet joint ventures, the commission of the two countries for scientific and technical cooperation resolved, also in Bonn in early April, to intensify cooperation in research-intensive technologies. Minister of Research and Technology Riesenhuber appeared very satisfied with these results following his return from Moscow. Because the involvement of scientists from Berlin in the cooperative ties is now reportedly recognized in principle, a good starting point has been created for further agreements with other East Bloc countries. It is allegedly now a matter of getting started with the agreed-upon projects as quickly as possible.

The nuclear energy agreement provides for cooperation in the drawing up of nuclear technology plans, in the construction and operation of water, gas and liquid-metal cooled reactors and of corresponding nuclear power plants, in safety and radiation protection, in the handling of radioactive waste, in nuclear fusion and plasma physics and in fundamental research on materials.

Questions of nuclear safety were at the forefront during Riesenhuber's talks in Moscow. In view of the dramatic Soviet plans to expand nuclear energy--fivefold by the year 2000, to 170,000 MW--the German reactor industry, which is the world leader in safety questions, appears to have good market chances.

In nuclear fusion research, the plan to operate the next fusion machine in four-way cooperation between the United States, the USSR, Japan and the European Community is now being discussed again in earnest.

Agricultural, Biological Research, Exchange

Duesseldorf HANDELSBLATT in German 6 May 87 p 2

[Editorial by Gerd Janssen: "German-Soviet Interdepartmental Agreement Complete: The Ruse of Reason"]

[Text] What is for now the last of the three German-Soviet interdepartmental agreements has been given the necessary signatures. FRG Minister for Food, Agriculture and Forestry Ignaz Kiechle and First Deputy Chairman of the USSR Council of Ministers V.S. Murakhovskiy have signed the agreement on agricultural research in Bonn. The nuclear agreement and the health care agreement were signed earlier and put away for safekeeping.

The most recent accord provides for an exchange of research results, scientists and biological material, as well as joint scientific projects. As early as in 1987/88, a tangible project is to be undertaken: the use of phytogenetic resources for plant cultivation, the feeding and maintenance of livestock, reproductive physiology and integrated plant protection. An impressive program.

It is true that for the most part the conversion of research results into practical applications is a long time coming, so that there should be no fear of negative effects on the export of highly subsidized Western agricultural products to the USSR in the foreseeable future. However, if Moscow could, through rapid progress on its own soil, help inspire the ideals of the market economy in agriculture in this country, this would surely be an original contribution to the competition of the systems, a ruse of economic reason, so to speak.

12271
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FINLAND-ESTONIA: UNIVERSITIES PROMOTE TECHNOLOGY, STAFF EXCHANGE

Helsinki KANSAN UUUTISET in Finnish 17 Apr 87 p 26

[Article: "Turku and Tartu Universities to Colllaborate"]

[Text] "My visit here in Turku is one small example of what the new Gorbachev reform politics mean for the Soviet universities," said the Tartu University Vice rector Ants Kallikorm during his visit to Turku yesterday. As a culmination of his week-long visit he undersigned a cooperative work agreement between the Turku and Tartu Universities .

Turku and Tartu Universities did not have an agreement for cooperation before this; however, the universities have a common successful past. Both universities were founded on the model of Uppsala University, Tartu in 1632 and Turku in 1940. The by-laws of both are the same word for word.

Many illustrious Finns have studied at Tartu in the past, and the father of the present Turku University Chancellor, Olavi Grano, was instrumental in laying the foundation for the teaching of geography at Tartu at the turn of the century. Today about 120 professors and 7500 students work at the nine departments and 87 institutions of the Tartu University.

According to the agreement signed yesterday, the universities will exchange literature and reports of their own scientific research and projects. The universities will also try to arrange cooperative topic-centerd symposia. Contacts will be sought between researchers in the same field, and at the same time opportunities for long term exchange of researchers, said the Turku University Rector, Arje Schein.

The Turku University board will give its final approval of the agreement next week. According to the revamped board of higher education the approval on the Soviet side will take place in Estonia and not in the USSR.

Freedom for Higher Education Has Increased

According to the Vice-rector, Ants Kallikorm, the independence of the universities has increased considerably after the Soviet reforms. Now the rectors can decide on matters without orders from above. The universities can

also freely forge ties with other Soviet as well as foreign universities according to need.

The intention is to raise the level of research to a new qualitative level. A higher standard than formerly will be demanded of the universities, but they will also be given more resources and freedoms than before, says Kallikorm.

As a part of the reform in higher education the position of the students will be improved as well as their opportunities for education. The motivation of the young students and their opportunities for continued education will also be enhanced in various ways.

Same Orientation at Turku and Tartu

According to Vice-rector Kallikorm, the purpose of the reforms in teaching and research is to create pre-conditions for and to speed up national economic reform. Great emphasis is placed on the influence of higher education for society in the USSR and attempts to forge additional ties are encouraged.

According to Rector Arje Schein, the freedom from orders coming from above has also decreased [as published] in Finnish universities; we are striving for goal-directed leadership. The university can decide for itself how to divide the funds it has been granted for research, as is now done in Tartu. Turku University also has resources for cooperation with foreign universities.

Rector Arje Schein says that Finland also strives to develop ties between higher education and the rest of society, even to the extent that some are worried that the universities are being led by business enterprises. According to Schein, however, the ties between higher education and the rest of society will be strengthened even further and that this will not remove the opportunity for the universities to develop their own activities.

12989
CSO: 3698/442

ITALIAN PARTICIPATION IN SECOND PHASE OF ESPRIT

Rome NOTIZIE AIRI in Italian Jan-Feb 87 pp 10-15

[Article: "Conference on 'ESPRIT--Experience and Prospects for Italian Participation'"]

[Text] The second phase of the ESPRIT project, the European program for precompetitive research on information technology, will probably start by next summer. The European Community Commission has requested that the EEC allocate 2.05 billion ecus (about 3 trillion lire) for this program, which will be approximately matched by funds from European industries participating in the program. This financing is about 2.5 times higher than that of ESPRIT's first phase and is considered "irreducible" by the minister for Scientific and Technological Research, Senator Luigi Granelli. He has announced that Italy will fight in the EEC to keep expenditures for ESPRIT 2 at this level. "Otherwise, the success of the first phase of the program will have been in vain."

The minister reported on the prospects of the ESPRIT program and Italian participation in it at a conference held under the auspices of the ministry Offices for Scientific Research and the National Research Council [CNR] in Rome last 23 January.

Minister Granelli also dwelt upon similar problems at the European Council of Ministers, saying that Italy will make every effort to maintain European research expenditures at 7 billion ecus and ESPRIT 2 expenditures at 2.05 billion ecus.

The minister reported that the greatest resistance in the European Community comes from Germany, Great Britain and France. Senator Granelli insists that it is in the international interest to increase EC involvement in the sector. Having expressed satisfaction with the success of the initial phase of the ESPRIT program, Granelli pointed out the need for better coordination of ESPRIT with other EC programs such as RACE [Research in Advanced Communications in Europe] and with programs outside the Community, such as EUREKA. EUREKA's success, the minister said, was a reason for speeding up the EC program.

As for Italian participation in ESPRIT, Minister Granelli said that it is satisfactory and certainly deserving of further expansion. Thus the experience gained through ESPRIT can be extended to other fields. Senator Granelli concluded by expressing a very positive opinion of the contribution of the CNR and the CIGE, which has been operating well and will do

even better when the projects and programs data bank goes into operation as scheduled next April.

The conference was organized by the Italian ESPRIT Management Committee. Participating in it were the best-known Italian experts in the sector and Michel Carpentier, the EEC general director of management for telecommunications, the information industry and innovation.

It was an opportunity to report on the first phase of the ESPRIT program (in which EC investment was 750 million ecus matched by business) in view of the launching of the second phase, which is presently in a stage of advanced planning in the Council of Ministers.

The ESPRIT program is intended to improve the technological base of the EC information industry in order to make it more competitive on the world market. The research program is characterized by: (a) advanced precompetitive projects bringing together industries, research centers and academic organizations; (b) EC certification, whereby at least two industries of different nationalities are to participate in each project. In the first phase, which is scheduled to last 5 years, the research plan is subdivided into five areas: (1) advanced microelectronics, (2) software technology, (3) advanced data processing, (4) office automation systems, (5) factory automation systems. Italy has an important share in the program, as is shown in the table below.

The conference was opened by Prof Luigi Rossi Bernardi, president of the CNR. He announced that Minister Granelli had sent to the CIPE [Interministerial Committee for Economic Planning] proposals for finalized programs on solid-state materials and parallel-system computers. Prof Giuseppe Biorci, president of the CNR's National Engineering and Architecture Committee, said that the Italian scientific community was ready to welcome the ESPRIT program when it was proposed, essentially because the CNR had acted in a timely manner in the sector, mainly by becoming involved in electronics and data processing. In substance, Biorci said, the Italian response to ESPRIT has been very enthusiastic, rather more so than in other research sectors, even though Italian involvement in the sector is still too modest.

Michel Carpentier represented EC policy in the sector of information technology, pointing out that ESPRIT's basic objective was to improve European competitiveness. Carpentier spoke at particular length about EC policy in the sector. This policy is based on a few main principles: strengthening the scientific and technological base through industrial research and development projects; implementing research results and integrating them into production and marketing; creating conditions favoring the formation of a large domestic market and the testing of products and services; stimulating dynamic interaction between producers and users of products and services; and contributing to the development of a common telecommunications policy.

The second phase of ESPRIT, Carpentier said, calls for concentrated efforts in three areas: microelectronics and peripherals, data processing systems, and applications of data processing technology.

Startup is planned for 1987, and the personnel needed is estimated at 30,000 a year.

Giancarlo Corazza, a professor of electromagnetism and circuitry at the University of Bologna and an Italian delegate to the EMC—ESPRIT Management Committee—said that the national research program (Law 46) on microelectronics has effectively laid the groundwork for Italian participation in ESPRIT.

He added that it is now necessary to solicit financing for the second phase of the project.

Concerns about costs to the EEC in the 1987-91 phase of the project were expressed by Carlo Eugenio Rossi, chairman of the Confindustria Research and Innovation Study Committee. He mentioned that the 10.35 billion ecus in the Commission's initial proposal have dwindled to 7.73 billion and, finally to 3.7 billion. Rossi emphasized that research and development accounts for only 2.75 percent of the total EEC budget as opposed to 65 percent for agriculture. Rossi also pointed to small and medium business's consistent participation in ESPRIT.

Augusto de Flammineis, a STET [Telephone Finance Corporation] official for technological innovation said that the group is involved in 33 ESPRIT projects. He indicated that the program has achieved important results, even though there are a few drawbacks such as the excessively high number of partners (as many as 20!) or the often pro forma nature of collaboration. He added that the ESPRIT 2 program will seek to remove these inconveniences.

Bruno Lamborghini, director of economic studies at Olivetti, said that the methodology of international collaboration initiated by ESPRIT is "in the blood" of European businesses. He hopes that the intergovernmental impasse on financing will be overcome and that the ESPRIT and EUREKA programs can be coordinated.

In the afternoon, the convention broke up into five interest sessions featuring Italian agencies and businesses participating in the program. The sessions reflected the five areas of ESPRIT 1. In conclusion, the five session coordinators took part in a round-table discussion.

A summary of Italian participation in ESPRIT is given below. It is taken from a document issued by the CIGE and distributed at the convention.

An examination of the data shows that the percentage of proposals with Italian participation is especially high in area 4 (Office Automation) at 62.7 percent. Compared with general media (43.7 percent), the percentage of area 3 (advanced data processing) is also good: 51.9 percent, while area 2 (Software) is decidedly lower at 33.3 percent, as is area 1 (Microelectronics) at 28.3 percent.

ESPRIT 1

(1) Proposals presented with Italian participation:

area / year	1	2	3	4	5	Total
1984	8	15	22	20	30	95
1985	15	25	35	20	29	124
1986	3	12	13	2	5	35
Totals	26	52	70	42	64	254

Total number of proposals accepted:

156	166	249	161	226	957

Percentage of proposals with Italian participation:

16.7	31.3	28.1	26.1	28.3	26.5

(2) Proposals accepted with Italian participation:

area / year	1	2	3	4	5	Total
1984	6	8	13	15	8	50
1985	8	5	12	13	8	46
1986	1	3	2	4	1	11
Totals	15	16	27	32	17	107

Total number of proposals accepted:

53	48	52	51	41	245

Percentage of proposals accepted with Italian participation:

28.3	33.3	51.9	62.7	41.5	43.7

Area 1: Advanced microelectronics
Area 2: Software technology
Area 3: Advanced data processing techniques
Area 4: Office automation systems
Area 5: Factory automation systems

8782
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JOINT ITALO-FRENCH ASSOCIATION FOR R&D

Rome NOTIZIE AIRI in Italian Jan-Feb 87 pp 20-23

[Article: "Initiative to Create an Italian-French Association for Technological Research and Development"]

[Text] At their last bilateral summit meeting in Paris in November 1986 the governments of Italy and France agreed to create jointly an association for technological research and development in order to increase cooperation between the two countries in that sector.

This association will be a permanent organization for sharing and coordinating activities. It will enhance information exchange and contacts between businessmen in both countries in the area of industrial research; it is intended especially to encourage operators to coordinate mutual undertakings, joint ventures, etc.

The two governments were motivated to establish this organization because the Eureka project has been a success in both Italy and France. This project, which was designed to stimulate European technology, engendered in a short time numerous instances of cooperation between companies of both countries.

Indeed, new forms of world competition require that alliances be formed to conduct research if only to share the costs, risks and information involved in the ever expanding work of research and innovation.

In addition, the development of large European Community and European technological programs in the fields of data processing, telecommunications, and space offer opportunities for collaboration that companies and laboratories of the two countries are seeking to exploit.

The association will concentrate on "diffuse" technologies: new materials, new production and communication processes, biotechnology, etc. These technologies are giving new form to modern industry as they spread into traditional sectors where small and medium companies have a key role. They offer excellent opportunities for cooperation because they indicate ways in which potential partners may complement one another, thus opening the way to new alliances in the context of Eureka and European Community programs.

In the fields of telecommunications, data processing, aerospace, the environment, and transportation the association will also be in a position to function collegially in harmonizing positions and promoting coopera-

tion for the purpose of implementing large European programs. Finally, there are strategic areas of industrial modernization whose importance has not yet been reflected in European projects, such as standardization and the development of tertiary industries (engineering, consulting, etc.). The association will also be able to promote initiatives of cooperation in this field.

To develop its three-fold mission to promote information exchange, encourage contacts and support initiatives, the association will have three modes of action:

1. organizing forums where industrialists can discuss strategic problems of technological development and complementing these discussions with visits to appropriate work sites as necessary and desirable;

2. organizing clubs in which industrialists and researchers of both countries can meet periodically to confer upon precisely defined themes and options in light of their potential synergies;

3. supporting a pool of initiatives for cooperation, mainly by contributing to project appraisals and by identifying partners and their options and sources of financing.

To prepare these activities and furnish informative support to its own members, the association will produce various types of services:

1. analyses of the technological and strategic resources of business in both countries;

2. communications on the projects and programs of cooperation and their updating and development;

3. identifying supply and demand for technological transfers.

Ultimately the association will be able to support the enhancement of the technological and industrial image of both countries for a much wider "audience" than its members alone.

The association will be open to companies, laboratories, and French and Italian public research agencies. It will be governed by a High Commission composed of officials from both countries. A smaller Committee of Directors will manage the association, and there will be a small permanent office in Italy with one or two corresponding offices in France. The financing will consist of both public subsidies and quotas from corporate participants.

Contacts have been initiated between public agencies and industries in both Italy and France in recent months for the purpose of starting up the work of the association. In Italy, the association will be headed up by the ministries of Scientific Research and Foreign Affairs. Plans are that the association will officially begin operations in the next few months.

8782
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BRIEFS

AERITALIA'S 1986 PROFITS—Rome 2 April 1987. Aeritalia has finished in the black for the 6th consecutive year. This was announced by the company's board of directors, whose meeting in Rome was chaired by Renato Bonifacio. In 1986, Aeritalia had a turnover of 1.4 trillion lire (not including that of associated companies) for a 16 percent increase over the previous fiscal year. Net profits rose 34 percent, going from 27 billion lire in 1985 to 36 billion in 1986; orders received increased 28 percent, from 2.021 to 2.577 trillion lire. The Alfa Romeo Avion and Officine Aeronavali of Venice subsidiaries also showed positive results. Alfa Romeo Avion's 1986 turnover reached 171 billion lire with 4.2 billion in profits, while Officine Aeronavali had a turnover of 47 billion and a profit of 900 million. [Text] [Rome TELEINFORMATICA 2000 in Italian 2 Apr 87 p 3] 8782

AGUSTA'S 1986 PROFITS—Rome 2 April 1987. Agusta's board of directors has accepted the report of the 1986 budget, which shows a net profit of 24 billion lire. Aeronautical Construction made the best showing in the Agusta group with assets more than triple those of the previous year. The group is an industrial power that controls 21 companies in Italy and abroad. It is organized in three divisions: helicopters, aircraft and aerospace systems. The assets include the budgets of Southern Helicopters, Agusta Aviation Corporation, Agusta International, MV Voghera Mechanical, and Agusta Systems. The other companies in the group did not balance their budgets but did show definite improvement. The consolidated budget of the Agusta group reflects a net profit of more than 10 billion lire. This is confirmation that the Agusta group is out of the woods and back to normal. The budget figures are particularly significant because the Agusta group fell on such hard times in 1983-85 that the current management predicted that the books would be balanced only in 1987 and that the group would show a profit again only in 1988. [Text] [Rome TELEINFORMATICA 2000 in Italian 2 Apr 87 p 4] 8782

USSR-WEST: 12 JOINT VENTURES--Moscow, 28-29 Mar (VWD)--Thus far, the USSR has concluded concrete agreements for joint ventures with 12 foreign companies. Another 39 joint projects have "begun to take shape," Deputy Chairman of USSR Council of Ministers Vladimir Kamentsev said in Moscow. According to Kamentsev, the USSR is interested in 121 of the approximately 200 offers from around the world. One agreement concerns a joint venture with a Finnish company for recycling synthetic materials. A timber project is reportedly being prepared with a Japanese company. West German industry is involved in joint projects for producing self-propelled cranes and shoes. Kamentsev mentioned in this regard Salamander AG in Kornwestheim. [Text] [Duesseldorf HANDELSBLATT in German 30 Mar 87 p 11] 12271

CSO: 3698/436

NORWEGIAN-JAPANESE MACHINE TECHNOLOGY TO USSR

Duesseldorf HANDELSBLATT in German 6 May 87 p 15

[Text] Tokyo, 5 May (GA)--Five members of the U.S. Congress have introduced a bill providing for a ban on the import of products by companies of the Toshiba group. The reason for this initiative is the charge that Toshiba Machine, in conjunction with the Norwegian firm Kongsberg Vaapenfabrikk, has circumvented COCOM regulations by selling top-grade milling machines for surface treatment of marine propellers, including the necessary software, to the USSR.

Toshiba rates as one of the potential Japanese participants in SDI, the U.S. space defense plan, for which the United States is placing high demands with respect to secrecy and screening. The current affair began last year when the U.S. military entities responsible for tracking the movements of the Soviet submarine fleet were suddenly no longer to gather accurate information on the position and deployment routes of the submarines using the standard locating equipment based on acoustic signals.

Position of Soviet Submarines Could No Longer Be Fixed

In attempting to find the cause of the drop in noise level of the submarines, the Pentagon, in conjunction with the U.S. intelligence services in Japan, came across a transaction that took place at the end of 1982, in which the Japanese machine tool producer Toshiba Machine sold four milling machines to the Soviet Machine Import Enterprise. The U.S. theory is as follows: These machines made surface treatment of the submarines' propeller blades possible, resulting in the established reduction in noise.

The Americans then approached the Japanese government on an official level last year, requesting information on whether this transaction had been carried out in accordance with the provisions of the COCOM regulations on high-tech exports to state-run trading partners.

United States Put Off by Dock for Vladivostok

The office within the Japanese Ministry of International Trade and Industry (MITI) responsible for approving such exports (the Security Export Control Office), which is also responsible within this ministry for Japanese participation in SDI, consequently informed the U.S. Department of Defense

that the export deal in question had been deemed not to be COCOM-relevant and approved, and that there was no violation of the agreement.

The Americans, however, were not willing to let it go at that. The memory of the sale of a Japanese wet dock, which was ultimately deployed at Vladivostok, the Far East base for the Soviet naval forces, and which led to a serious crisis of confidence between Tokyo and Washington, was too fresh. Moreover, this was not the first time that information had become available about COCOM-relevant exports from Japan to the East Bloc.

The Americans argued that it was senseless to simply examine the matter superficially on the basis of information from the producer. What was instead required was a direct police investigation, since there was well-founded suspicion to the effect that Toshiba Machine had consciously provided false information on the technical configuration of the machines in order to guarantee a smoother transaction with its Soviet partner.

Weinberger: National Security Threatened

In order to give the matter more emphasis, the Pentagon went public with the affair at the end of March. Defense Secretary Weinberger also expressed to former Japanese Minister of Foreign Affairs Abe, who visited Washington on 20 April on behalf of Japanese Prime Minister Nakasone, his deep concern about this export transaction, which--according to the CIA--had effectively developed into a threat to U.S. national security. Abe responded with an assurance that the Japanese government agencies would soon have the results of the probe.

And this was in fact the case only one week later: On 38 April, MITI announced details of the transaction that prompted the ministry to turn the case over to the relevant national security authorities for direct investigation as a result of possible violations of the law. The following are the most important of MITI's findings:

Between December 1982 and June 1983, Toshiba Machine, one of the leading Japanese producers of machine tools (50.1 percent of which is in the hands of Toshiba Corp., with just under eight percent of its converted sales figure of approximately DM 1.3 billion in the 1986-87 fiscal year attributable to exports to state-run trading partners) sold, in conjunction with the general trading firm C. Itoh & Co. as well as well the trading firm Wako Koeki Co., which specializes in trade with the East (the principle stockholder is the general trading firm Marubeni), four milling machines (total price: $17.43 million) to the Soviet Machine Import Enterprise. In June 1984, an operating program for the surface treatment of marine propeller blades was finally delivered, which according to American information originated with the Norwegian company Kongsberg Vaapenfabrikk and was initially exported to Japan.

False Information to MITI

At the time, the ministry approved the transaction, considering it not to be COCOM-relevant since according to the information provided by the producer, the machines were designed only for a simultaneous control system around two

shafts. However, MITI has now determined that the machines were in fact designed for a nine-shaft control system--and were thus more than four times as complex--so that a violation of the law for providing false information is suspected. The software program delivered later made the simultaneous control of nine shafts possible, which would have required export approval from MITI; this was not obtained by Toshiba Machine.

Because there is no longer any possibility of prosecuting the company for the illegal machine transaction due to the period of time that has transpired, the ministry used these findings to bring charges against Toshiba Machine for the software deal, based on suspicion of violation of the Exchange Control Act.

Only 2 days later, on last Thursday, Japanese state security--the official names of the agencies involved are "Department for Economy and Life" and "Department 1 for External Affairs" of the National Police Agency--conducted searches of the headquarters and 13 branch plants of the machine tool manufacturer.

Punishment of Toshiba and Trading Houses

At the same time, MITI began to examine the question of what concrete punitive measures could be taken against the company, as well as against the trading firms in question, in the area of limiting their export activities.

Japan's Prime Minister Nakasone, when asked about the affair during his visit to Washington last weekend, said that the police is working on the matter as a legal offense, and that a violation of the law is difficult to pin down since the machines were exported disassembled.

At the same time that this was happening, five members of Congress were introducing a bill that would prohibit the import of products by the Toshiba group and the Norwegian company and would bar the U.S. Department of Defense from maintaining business relations with these companies.

Oslo Is Fearful for Its Missile Trade

This prompted the Norwegian government to send a delegation to Washington on Sunday, since Kongsberg Vaapenfabrikk is currently attempting to sell its "Penguin" air-to-sea missiles to the Pentagon and other NATO armies. The Norwegian police intends to present the results of its investigations at the end of the month.

On the other hand, the Toshiba Corp. is submitting a proposal to the U.S. Department of Defense on making available military know-how. At the same time, the company is negotiating with an American partner on a cooperative arrangement for the SDI program in the area of laser and missile technology.

Japan's economic newspaper NIKKEI quoted in this regard a MITI official, who said, "This law initiative is being accorded significance as a 'mild' educational measure." The goal is to make things unmistakably clear to a potential SDI participant, the NIKKEI commentary said.

12271
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MEDICAL TECHNOLOGY JOINT VENTURE BETWEEN PHILIPS, UK'S GEC

Duesseldorf HANDELSBLATT in German 29 Apr 87 p 19

[Article by Ursula Bernhard: "Expenditures for Medical Technology Research and Development Are Increasing: The Market Is Again in Motion with the Joint Venture Between Philips and GEC"]

[Text] Duesseldorf, 28 Apr--The market in medical technology has been set in motion again on an international level. The announced consolidation of the British General Electric Corp. and the Dutch Philips concern in this area (see HANDELSBLATT, 29 Apr 87) has drawn a considerable amount of attention in that branch of industry, having in one fell swoop made the new joint company the top force on the world market, pushing aside U.S. General Electric and Siemens.

The joint venture, to which Philips will contribute its activities in medical technology (sales: $1.37 billion) and to which GEC will contribute its subsidiary Picker International (sales: $632 million) thus represents an annual sales figure of $2 billion. In comparison, General Electric achieves "only" $1.75 billion, with Siemens at $1.5 billion. In fourth place is the Japanese Toshiba concern. Both companies are hoping for natural synergetic effects from the consolidation.

The wave of mergers in this field called for by many experts is thus continuing. The announcement that the leading U.S. producer of glass, chemicals and automobile enamels, PPG Industries, has purchased the medical technology group of Allegheny International Inc. clearly fits in with this trend. PPG's announcement indicated that it wants to expand its biomedical systems division, which was formed only last year through the consolidation of Freiburg's Hellige GmbH (which previously belonged to Litton) with the medical technology division of Honeywell.

Even though this line of business is still very heterogenous in structure, the number of worldwide suppliers offering a full line of equipment continues to shrink. This represents tribute paid to a development whereby increasingly high demands are place on the technical and financial resources of individual companies. Small and medium-sized companies have long since ceased being able to afford the costs of research and development required by modern video diagnostics, even those for nuclear spin tomography, computer tomography and

nuclear medicine alone. They see themselves compelled to either seek cover with a large company or concentrate on a niche of the market. Only recently, officials of U.S. General Electric indicated in an interview that they are prepared to acquire small and medium-sized companies for the purpose of a stronger expansion in Europe.

While competition in the area of modern technology is becoming increasingly fierce, drastic cutbacks in health care are taking place around the world, since the share of the gross national product allocated for health care in the highly-developed countries has reached an upper limit.

On the world's largest market for medical technology, the United States, which accounts for just under half of the total worldwide sales of around $10 billion, a certain amount of stagnation cannot be overlooked. In Japan, where foreign producers are primarily active on the market with specialized products since any other access to the market is discouraged by bureaucratic obstacles, sales are similarly off. In the FRG, the ZVEI [Central Association of the Electrotechnical Industry] recently voiced a complaint that the willingness to invest in modern technologies has fallen off again (see HANDELSBLATT, 27 April 1987).

In the view of experts, there continues to be a significant lag in Europe in installed technology, compared to the United States and Japan. They point out that the per capita ratio of computer tomographers in Japan is almost three times as high as in the FRG. In that country there are 25 computer tomographers per one million inhabitants, compared to 16 in the United States and only 9 in the FRG. The producers of medical equipment in this country feel strangled most of all by the "Guidelines for the Economic Use of Large Medical Technology Equipment," which went into effect on 1 April 1986. These guidelines include a list of regulations concerning large medical technology equipment and methods for the purpose of space planning.

The affected parties see this as the wrong way to restrict expenses and note that the total costs of electromedical technology are in the DM 9 billion range, which constitutes only about four percent of the total annual expenditures for health care.

In contrast, modern technology is being used vigorously in the United States in order to reduce the stay of patients in clinics and in this way to achieve a savings. In the FRG, hospital stays are still too long, it is said. Moreover, the use of modern medical technology is supposedly less of a burden on the patients. The sale of large medical equipment in the FRG is increasingly becoming a political issue due to the high initial costs (the installation of one large unit can cost several million German marks), the critics complain.

Thus, it comes as no surprise that the European producers are increasingly looking for sales opportunities abroad. This was probably a major incentive for Philips to enter into the joint venture with GEC and its subsidiary Picker, since Picker's presence on the U.S. market is considerably stronger than that of the Dutch company. The strongest suit of the latter is conservative X-ray technology, while Picker is ahead in nuclear spin tomography, computer tomography and nuclear medicine and would like to expand its presence in Europe.

12271
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FRG-USSR COLLABORATION: EXHIBITS, SPACE, JOINT VENTURES

USSR at Hannover Industrial Fair

Duesseldorf HANDELSBLATT in German 30 Mar 87 p 8

[Article by Yuriy Bogdanov, director of the Soviet exhibit at the Hannover Trade Fair: "New Technology. Represented by Over 350 Exhibitors. Long Tradition of Participation in Hannover"]

[Text] Participation by Soviet foreign trade organizations at the international trade fair in Hannover has become a tradition. Each time there is the opportunity for all to view other's most recent efforts in the areas of science and technology and to deepen and expand contacts in the business world.

The primary objective of participation by the USSR at the 1987 Hannover Trade Fair is to further develop ties between the USSR and the FRG in terms of trade, economics, science and technology, as well as to present the achievements of the Soviet Union in this 70th year of the great socialist October revolution. The thematic structure of the Soviet contribution to the trade fair, organized by the Chamber of Trade and Industry of the USSR, was also established accordingly.

Development Up To the Year 2000

The exhibit articles and the textual material provide information on the acceleration of scientific and technical progress in the USSR during the period up to the year 2000. They also provide an example of the export potential of the Soviet economy in the sectors represented at the exhibit.

The Soviet exhibit in Hannover covers a total area of 1565 square meters and is contained in five pavilions (Nos. 3, 4, 7 12 and 20). Visitors can see approximately 350 different displays at the stands of 22 foreign trade associations, ministries and other central agencies, as well as those of 84 national enterprises.

The exhibitors include the Academy of Sciences of the USSR, the Institute for Problems in Materials Science and the Institute for Superhard Materials of the Academy of Sciences of the Ukraine, the State Committee of the USSR for Atomic

Energy Management, the Ministry for Energy Management and Electrification of the USSR, as well as the "Medexport," "Maschpriborintorg," "Elektronorgtechnika," "Maschinoexport," "Licensintorg" foreign trade associations and others. The Soviet state of Belorussia is represented by a special exhibit.

The displays were selected in conjunction with the organizational breakdown of the fair. They fall under the following exhibit areas: "Materials Handling and Storage Technology," "Control, Motion and Drives," "Electronic and Electrical Engineering," "Research and Technology," "Tools," "Suppliers' Exhibit."

Innovations Subject to Patents and Licenses

Exhibited are robot-equipped complexes, manipulators, measurement technology, systems for monitoring human health, new materials and laser technology. Information is also provided on innovations involved the area of patents and licensing.

Displayed in the "Research and Technology" section of the exhibit, for example, is the Radiovisor RV-3 which was awarded a gold medal at the 1986 Leipzig spring trade fair and which has been patented in England, the United States, France, Japan, the FRG and other nations. Of interest is a silver-free, light-sensitive composition which with the aid of photographic processes is used to produce images. These images can be produced on all possible surfaces, be it glass or paper, metal or plastic. The image appears immediately when exposed to light and is fixed by warming the layer to 80 to 100 degrees Celsius during the course of one-half to one hour. Visitors to the exposition can obtain additional information on the efforts of Soviet scientists and engineers from brochures, pamphlets and videotapes.

Soviet Launching for Western Satellites

Duesseldorf HANDELSBLATT in German 30 Mar 87 p 3

[Article by W. Skiba: "Licenses: Success on U.S. Medical Market. Soviet Rockets Expected to Launch Western Satellites into Orbit"]

Each year 80,000 to 85,000 inventions are registered in the Soviet Union. One third of the world's scientific production takes place in the Soviet Union. It is therefore no wonder that foreign firms show increasingly strong interest from one year to the next in Soviet technology in the area of ferrous and non-ferrous metallurgy, machine construction, energetics, medicine and the pharmaceutical industry.

The exchange of technology is particularly intense between the USSR and the other member nations of CEMA. But production under Soviet licenses is also being carried out at present in 20 highly developed Western nations. Thirty percent of all licenses issued go to the United States, Japan, the FRG, France, Great Britain and Italy. It is worth noting that the above-mentioned countries purchase twice as many licenses and patent rights for modern technologies from the USSR than they sell to her in return. This does not

exactly coincide with the widely circulated idea in the West concerning the technological "backwardness" of the Soviet Union.

Propaganda initiatives against trade with the USSR have not prevented the Japanese steelmaker, "Kobe Steel," from building 17 continuous casting plants for steel under Soviet licenses. There are also such plants in the east Slovakian iron mining combine in Kosice. The U.S. firm Multi Arc Vacuum Syntencis, Inc., is also very satisfied with Soviet technology, which has extended by a factor of three the useful life of metal cutting equipment. There is a continuing demand in the United States for the medicine, Ethmosin, which is produced under Soviet license. The antidepressant, Pyrasidol, which is produced using a Soviet process, has been successfully introduced in the FRG.

The USSR is also certainly in a position to enrich Western markets with new developments which generate interest among highly selective customers. Additional customers would surely be found if there were not all manner of politically motivated "sanctions" and "restrictions." In 1985, the foreign trade organization, Lizenzintorg, which imports and exports licenses, was given the right to issue licenses for the use of Soviet rockets to launch artificial satellites and space probes manufactured by foreign companies into orbit. Enquiries from possible customers are expected.

FRG-USSR S&T Exchange

Duesseldorf HANDELSBLATT in German 30 Mar 87 p 3

[Article by Nikolay Borissov, head of the administration for scientific and technical cooperation with the capitalist nations and the developing nations of the State Committee of the USSR for Science and Technology: "Scientific Cooperation. Forty-Nine Agreements with Private Companies. Possibilities for Cooperation By Far Not Exhausted"]

[Text] The basis for scientific and technical cooperation by the USSR with Western nations and with developing nations was established in the 1970's. The contractual basis developed during those years has to date lost none of its importance.

Currently there are 107 government agreements for scientific and technical cooperation with industrial nations and developing nations, and over 300 agreements which Soviet organizations and facilities have concluded with individual foreign firms. The majority of these agreements are still valid today.

Up until the beginning of the 1970's, the scope of the relations being established between the USSR and the FRG with regard to science and technology was not very substantial. These relations were sporadic in nature. After the signing of the Moscow Agreement in 1970 and the founding of the government commission of the USSR and the FRG on economic and scientific cooperation in 1972, these relations became systematic and began to develop according to a plan.

Moscow Agreement Provided New Incentives

Through joint efforts by both sides, a close-knit network of scientific and technical relationships with private companies in the FRG was created in nearly all primary areas of science, technology and industry--in chemistry, in mining, in machine-tool and equipment construction, in agriculture, in energy management, in the construction of transportation equipment and in other areas.

At present more than 50 industrial ministries and other central state agencies of the USSR maintain regular scientific and technical contact with over 350 firms in the FRG. Forty-nine agreements on long-term scientific and technical cooperation were concluded between Soviet organizations and individual private firms and large concerns. An agreement is in force for scientific cooperation and exchanges between the Academy of Sciences of the USSR and the German Research Association. Lively contact is maintained between universities, as well as in the area of public health.

Positive Results on Both Sides

Cooperation in production develops on the basis of joint efforts which take place within the framework of the agreement on scientific and technical cooperation. In accordance with this cooperation, production and sales, jointly with the FRG, of lathes, vertical boring and turning mills, toolroom milling machines, forging equipment and presses, pumps and mixers for ready-mixed concrete, equipment for producing cement chip board and several other types of equipment and industrial products are being realized today.

Based on the licenses obtained in the FRG, highly productive robots, thyristors for powerful electric motors, supports for x-ray machines, a number of subassemblies and aggregates for a new passenger car from the Volga automotive works and other industrial products are being produced in the USSR. For their part, companies in the FRG have obtained Soviet licenses for the "GTN-25" gas turbine, the process for producing formic acid, mass-exchange equipment, the process for melting down steel from a charge containing up to 100 percent scrap, and other licenses.

In all, the scientific and technical cooperation between our two countries has had a positive effect. As far as we know our partners in the FRG--representatives of firms and scientists who participate in the cooperation--share this view.

Given this positive estimation of the results of scientific and technical cooperation, which is doubtless of benefit to both sides, we are nevertheless of the opinion that its scope and the types of areas involved could be substantially expanded. Among other things which we consider to have potential is to explore the possibility of cooperation in the creation of new materials--in principle new technologies and techniques based on fundamental research which is being performed in the USSR in the areas of laser technology, solid-state physics, high-pressure physics, chemistry, petrochemistry, fine organic synthesis, genetics, biology and other areas. In

our opinion, our cooperative partners in the FRG could be specialized firms which have experience in implementing industrial technologies.

Peaceful Use of Atomic Energy

We would also be willing to considerably expand scientific and technical cooperation with companies in the areas of microelectronics, computer science and equipment construction. Just as modern production today is no longer thinkable without industrial robots, microprocessors and other electronic technologies which ensure enhancement of the labor process, reduction of original costs and improvement of product quality, so, too, do perspectives regarding economic cooperation depend on developing relations within these areas, not only in new fields but also in the traditional areas such as chemistry, mining and machine construction.

Additional areas in which the USSR and the FRG could successfully cooperate in solving current scientific and technical problems are in the areas of space exploration, the uses of atomic energy for peaceful purposes and environmental protection.

In July of 1986 the foreign ministers of the USSR and the FRG signed a government agreement in Moscow concerning scientific and technical cooperation. At the same time three specialized agreements between agencies were initialled regarding scientific and technical cooperation in the area of the peaceful uses of atomic energy, agricultural research, public health and medical science. It was agreed that all of these agreements will become effective as a single package via the signing of a special protocol at the government level.

When this agreement becomes effective, new organizations, in particular federal research institutes in the FRG, will be included in this scientific and technical cooperation. This will provide opportunities not only to expand the subject areas of cooperation but also to realize a higher scientific and organizational level.

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ACHIEVEMENTS, DEVELOPMENT OF BULGARIAN GENETICS INSTITUTE

Sofia SPISANIE NA BULGARSKATA AKADEMIA NA NAUKITE in Bulgarian No 6, 1986 pp 18-22

[Article by Senior Research Associate Manol Stilov: "Present State, Achievements, and Future Outlook of the Genetics Institute at the Bulgaria Academy of Sciences]

[Text] Genetics is comparatively new, but it is one of the fastest developing sciences. The theoretical, experimental, and applied aspects of contemporary genetics have almost led to a revolution in biology and have had an enormous influence on agriculture, medicine, and biotechnology. Genetics, as a theoretical basis for selection, has contributed greatly to the development of useful microorganisms, new varieties and breeds of economic crops and livestock, as well as in combating hereditary diseases of animals and man. It also studies the genetic influence of a large number of environmental pollutants and has developed methods to protect future generations from detrimental hereditary changes. In the last few years genetics has made a quantum leap as a result of the development of molecular biology and, more specifically, of molecular and cell genetics.

The genetics Institute at the Bulgarian Academy of Sciences, founded by our well known scientist and academician Doncho Kostov, has a long and complex history. Created as an Institute of Applied Biology and Organism Development, it passed through several stages (agrobiology, horticulture, genetics and selection at ASN) to return again to the system of the Bulgarian Academy of Sciences as an institute of genetics. At present, it is one of the most powerful scientific divisions of ETs in biology.

During the last 10 years the Institute has worked on questions related to some properties, mechanisms, and manifestations of gene action and the possibilities of its regulation and utilization. Success has been mainly in the field of plant genetics, but lately there have been achievements in the field of microorganism and animal genetics as well.

The principal fields of work at the Institute are the genetic, cytogenetic, and biochemical properties of hybridization and mutation, genetic control mechanisms of important biological and economic qualities and traits, the genetic basis of hybrid vigor and extranuclear inheritance, and the genetics of disease and pest resistance factors.

Substantial scientific and practical results have been achieved in these fields. Some of them have been quoted in highly regarded domestic and foreign publications, while others have had practical application with a significant economic effect. All research is part of basic research programs, biotechnology, and the food program.

By elaborating a number of methodical questions on plant cell and tissue culture utilization, important results have been achieved for intensification of the selection process.

Strains with double resistance to streptomycin and aminoethyl L-cysteine have been developed by somatic hybridization of alfalfa cell clones. Strains of alfalfa and tobacco resistant to different herbicides have been developed using in vitro techniques. It has been proved that by using cell cultures and plant regeneration it is possible to conserve the cytoplasmic sterility of tobacco. The sterility of a number of interspecific hybrids of tobacco, tomatoes, sunflowers, and peppers, has been overcome by using in vitro techniques.

The various symbiotic associations of unicellular algae with nitrogen-fixing and nonnitrogen-fixing bacteria, important in the development of strains of algae with increased protein content, has been studied. Colonies of algae resistant to kanamycin have been developed.

For the first time, proper reconstructed karyotypes of barley, in which all chromosomes and chromosome segments can be identified easily and clearly, have been synthesized. Primary and modified differential sensitivity models of the chromosomes have been analyzed and determined using these karyotipes. Changes in gene action (transcription) of ribosomal RNA cistrons located in the nucleous organizer region have been obtained by inducing certain chromosome recombinations which affect the satellite chromosomes. This work was awarded by the Academy of Sciences of the GDR. It has been established that the specific activity of mutagenic factors during induction of gene and structural mutations is related mainly to the great differences in the repair processes of these two types of mutations.

Differences in the repair systems' effectiveness of hertrochromantin and euchromantin were found during experiments and an attempt was made to explain the mechanisms of some induced structural changes of the chromosomes of plant models. The genetic risk for plant, animal, and human chromosomes (for example: sister chromatid exchange and others) from the use of certain pesticides in agriculture has been determined using appropriate methods and testing systems.

The presence of a new histone N-1° subfraction, absent in undifferentiated cells was discovered by studying the chromatin composition and structure during plant cell differentiation.

Using appropriate biochemical and cytological methods structural and functional changes in the cycle of chromosomes and nucleoluses during gamete and somatic cell development in the process of fertilization and early embryogenesis were studied in relation to their differentiated function in plants and animals.

New ways to increase the effectiveness of mutation induction by combining different types of mutagens and different action mechanisms, as well as by modifying the mutation process with physical and chemical modifiers have been proposed. By combining hybrid and mutation changes, a new type of wheat, not yet reported in the literature, has been developed which has a significantly increased number of spikelets per spike.

In relation to the study of genetic relationships, evolution, and utilization of the species' genetic potential, the genome composition of several hexaploid species of sunflower and one tetraploid type of triticale have been explained. The number of times of backcrossing required to develop valuable and stable types of sunflowers, triticale, and beans has been determined.

Ways to ensure the inheriting of important traits in allopatric hybridization of species from the genera Heliantus, Lycopersicon, Triticum, and Phaseolus have been determined.

Certain donors of valuable biological and economic qualities obtained by allopatric hybridization have been studied.

Using aneuploidy methods, the degree of functional similarity between the various chromosome arms, chromosomes, and genomes of Triticum aestivum with the basic species variety of the genus Aegilops and some other species of the genus Triticum has been determined. On the basis of this research conclusions have been made regarding the origin, the generic and species divergence, and the evolution and nature of reproductive barrier systems among different species.

For the first time in the country, the wild species Hordeum bulbosum has been used successfully for hybridization with barley and a variety of allotetraploid, allotriploid, alloaneuploid, and alloplasmic dihaploid plants have been obtained uncovering a number of possibilities for their practical utilization in barley genetics and selection.

A method related to genetic systems transfer in apomictic reproduction of Tripsacum dactelaydes of the corn genome has been developed and large numbers of hybrid plants have been obtained.

From research on the genetic nature of hybrid vigor and its utilization, a new hypothesis has been proposed based on additive allelic and non-allelic gene action. A method for early biochemical evaluation of genetic recombinations in self-pollinating strains of corn has been proposed on the basis of trait complementation, such as increased photosynthetic activity of chlorophyll and increased nitrate ion absorption efficiency of the roots. The following have been recognized as inventions: the method of obtaining seedless tomatoes by combining the gene for flower sterility and the gene for parthenocarpic fruits into one genotype; the method for obtaining hybrid pepper seeds by using maternal parent with a lethal gene, capable of restoning the normal genotype after special treatment; the method for obtaining hybrid tomato seeds using special maternal strains whose seeds germinate only after special treatment.

A recombination between genes for increased content of Vitamin A and the gene for determinate growth of the stalk has been obtained for the first time.

Some valuable results have been achieved in the field of extranuclear inheritance. For example, it has been established that the cytochrome oxidase system in sterile corn plants is abnormally and inadequately developed, which may cause ineffective oxidative phosohorylation, which in turn, amy lead to the formation of unviable pollen or partial abortiveness. The reduction of chloroplast function activity from lack of RSMS-types of tobacco has been proven and the foreign cytoplasm effect of some polyphenolic substances on the quality of production has been determined.

The procedure for development and reproduction of sterile corn analogs, on the basis of which analogs of all hybrids important for production have been developed, has been shortened. This work was awarded the Dimitrov Prize. At present, the method is being improved by androgenesis in which sterile analogs are obtained after only 2 generations instead of 6. For the first time TSMS sources in Nictotiniana maritima, N. exelsior, and N. bentamina have been discovered.

The genetic control for resistance to blight, mildew, dry rot, and TMN of varieties and strains of tobacco obtained by interspecific hybridization has been determined from research on the genetic basis for disease resistance. The gene efectiveness on the mildew polulation on tobacco and the population variety of the agents causing black and brown rust of wheat have been studied. The pathogenic varieties of the agents causing powdery mildew in wheat and barley, leaf and black rust in wheat, and the strain varieties of tobacco mosaic pathogens in tomatoes and peppers have been investigated. The generic varieties of SEPTORIOZA [unable to find meaning] in wheat and the pathogenic varieties of bacteria causing wilt and spot disease in tomatoes have been studied. New breeds of powdery mildew in barley and wheat have been discovered.

Important scientific and practical results have been obtained from theoretical research, the most significant of which are the following:

1) Twenty-three varieties and hybrids of various agricultural and decorative plants have been developed and recognized by the State Commission on Plant Varieties, namely: 8 varieties of tomatoes, 3 varieties of wheat, 3 varieties of soybeans, 1 variety of pepper, 1 variety of corn, 1 variety of sunflower, 1 variety of beans, 1 variety of parsley, 1 variety of celery, and 4 varieties of geranium. Some varieties are introduced in farming and the economic effect of their cultivation is significant. In addition to these, 24 other varieties of hybrids and strains have been presented for testing and recognition by the DSK [State Commission on Plant Varieties].

2) A weakly pathogenic viral strain of TMV-Bulgaria'85 has been developed. It has vaccine properties and is used to vaccinate tomatoes under field conditions.

3) The first several hundred plants of grapevine have been obtained by experiments on vegetative micropropagation "in vitro". The methodology will be improved with the aim to develop a technological method for rapid reproduction of valuable varieties of economic crops.

4) A great number of genetic varieties of mutants and hybrids with valuable biological and economic qualities, capable of serving as trait donors in selection have been obtained as a result of research in the field of experimental mutagenesis and allopatric hybridization. Such are the high-protein high-fat stabilized mutants of peas, soybeans, barley, wheat, corn, and triticale.

5) New sources for cytoplasmic and other types of male sterility in tomatoes, sunflower, tobacco, corn, and alfalfa have been discovered. In some crops (e.g. sunflower), suitable fertility stabilizers and restorers have been found.

6) New genes for disease-resistant wheat, tobacco, and tomatoes have been determined.

During the Eighth 5-Year Plan, associates of the Institute have received 27 authorship certificates for inventions (e.g. varieties, technological procedures, methods) resulting from scientific and applied experiments. The plan to implement the scientific accomplishments of the Institute, the budget for which exceeded 25.4 million leva, was fully carried out, spending 1 million leva less than was budgeted. Furthermore, the implementation of scientific innovations elaborated in the past and not included in the implementation plan was continued. The benefit from these additional implementations exceeds 20 million leva.

As shown by this short presentation, the Genetics Institute at the Bulgarian Academy of Sciences has developed important trends in modern genetics since, in addition to theoretical research, some valuable practical results have also been obtained. Now however, the question of whether these results and trends in research respond to the new requirements facing science is raised. Without doubt, genetics, as one of the strategic sciences, can and must play a significantly more important role in the development of such important trends and sectors of our economy such as: biotechnology, the food program, and environmental protection. Because of this, much more will be required from the Genetics Institute as well.

In the future, the Genetics Institute will direct its scientific research activities toward the basic strategic trends, namely to increase and accelerate molecular genetics research on the basis of which to elaborate and implement genetic engineering methods (e.g. recombinant DNA technology- regulation of gene expression) aiming for a more rapid development of new organisms with traits and properties of benefit to man. Especially promising in this respect is research on obtaining highly productive, high-quality varieties of plants, breeds of animals, and strains of microorganisms that are resistant to disease and stress factor. Special attention will be paid to the following: to increase research in the field of cell genetics and to implement cell and tissue culture methods for gene transfer in different species to obtain somatic hybrids in allopatric species and genera on the basis of protoplasts; to utilize cell mutagenesis, somatic embryogenesis, and other methods for rapid intensification of the selection process in important economic crops; to study the influence of dangerous environmental pollutants, causing negative hereditary changes of micro-organisms, plants, animals, and man; to increase research on hereditary changes of the adaptation potential of organisms to certain environmental factors.

A fundamental task will be to elevate the level of the traditional trends in genetic research by combining molecular genetics methods with classical methods to study heredity and its variation, aiming to shorten the selection process and to master the methods of controlling and directing the life processes of organism and population ontogeny.

While evaluating the significance of genetics during one of its conferences, the Presidium of the Bulgarian Academy of Sciences reviewed the present conditions and future outlook for development of the Genetics Institute. It evaluated positively its work to present and planned activities for its future development. The Presidium decided to create some new divisions (Section on Ecological Genetics and Laboratory for Plant Vaccines under the Section on Immunogenetics).

The most important aspect of the decision of the Presidium of the Bulgarian Academy of Sciences is that the Genetics Institute needs result-oriented help to modernize its research facilities for rapid development of the strategic trends in genetics and, especially, molecular and cell genetics.

With the elaboration of these new trends, the selection process of many plants, animals, and micro-organisms will be significantly intensified. The development of new trends will help elevate the level of research, which indisputably will lead to increased effectiveness of scientific experiments and accelerated implementation of scientific innovations in production.

By fulfilling the decisions of the Presidium of the Bulgarian Academy of Sciences the Genetics Institute will be formed ultimately as a scientific methodology and coordination center in the field of genetics in our country. The scientists of the Institute will exert maximum effort to transform into deeds the decisions of the 13th Congress of the BCP pertaining to science and the accelerated implementation of scientific accomplishments.

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CZECHOSLOVAK PRODUCTION, EXPORT OF MACHINE TOOLS

Prague SVET HOSPODARSTVI in Czech No 22, 24 Feb 87

[Article by Engineer Rudolf Hasek, CSc., deputy minister of the Federal Ministry of Metallurgy and Heavy Industry: "The Manufacture and Export of Machine Tools and Forming Machines"]

[Text] In order to increase the technological standards of production, it is necessary to keep in step with the most important scientific and technological advances, including those in automated manufacturing complexes. The Federal Ministry of Metallurgy and Heavy Industry branch concerns Skoda and Vitkovice are responsible for the manufacturing of machine tools, forming machines and equipment for rolling mills.

Lathes, horizontal boring and milling machines, planer type milling machines, vertical turret lathes, rotary tables and accessories, including transport between operations and handling of material, make up the basic part of the heavy machine tool system at the Skoda concern. They are exported to the entire world including developed capitalist countries, such as Sweden, Japan, Italy and Austria. The major portion of the export is destined for the USSR. The basic direction of the development in this field is focused on the increase of production capacity and thus also the work productivity through systemic improvements in manufacturing technology with the application of comprehensive automation. The development of a new generation of machines and accessories and entire work centers will incorporate them into flexible manufacturing systems, including the introduction of large automated machine tool nodes which will become available by the end of the Eighth 5-Year Plan.

The field of machine and forming equipment manufacture and, specifically, the Vitkovice concern is under the Federal Ministry of Metallurgy and Heavy Industry jurisdiction. The product technological standards and utility are compatible with the world top-of-the-line manufacturers. The present mix of specialized forming machines consists of four groups: equipment for processing metallic waste; equipment for hammer forging; equipment for forming sheet metal and pipes (plane forming); and equipment for volume forming. No new types of forming machines are planned for the near future. However, there will be significant changes made within the existing product mix.

In case of equipment for processing metallic waste, which includes a baling press, a new heat baling method will be evaluated. The briquette forming production lines for metal chips already represent a significant change. In case of equipment for hammer forging, the intentions of the technological development are focused on solving problems in the area of hammer forging technology, machine building, and the development of hammer forging control systems. In the area of equipment for plane forming, there will be a development of mainly automated lines with the TP [expansion unknown] automated advance. The development of the CTM [expansion unknown] and CTV [expansion unknown] hydraulic presses will incorporate new technology. In the future, the forming centers with the CYT [expansion unknown] presses will certainly find their use in the manufacture of shaped pieces. In case of the volume forming equipment manufacture, there are plans for a significant innovation of the LZK press, consisting mainly of improving the operations and making them less material and energy intensive.

In rolling mill equipment, Skoda and Vitkovice concerns are among the top world manufacturers. The technology of the equipment is fully compatible with modern rolling trains of top foreign manufacturers. The high technology of the products is systematically maintained by on-going innovations of selected equipment, user technologies and improved Czechoslovak automation technology. During the Seventh 5-Year Plan, several deliveries were made, such as the deliveries for the four-high rolling mill 3000, in Zdanov, USSR, deliveries for the Soviet Janakijevo and Magnitogorsk blooming mills and for the Sverdlovsk twenty-roller tandem. In case of non-socialist countries, deliveries were made of the medium profile section rolling mill [SPT] 500 to Iran, SPT 700 to Turkey and the SV 800 to Pakistan.

During the Eighth 5-Year Plan, the TSP 2500 Novolipeck will be the largest delivery made by the Vitkovice and Skoda concerns. Using this new TSP train, approximately 8 million ton per year of strips rolled into coils of carbon and low alloyed steels are expected to be manufactured. A significant portion of these coils is to be manufactured using mechanically improved procedures, attained by computer programmed rolling.

The development of the rolling mills equipment branch in the future will focus on the rebuilding and modernization of the present capacities. However, in terms of sales, this branch will continue to be a viable marketing sphere of the metallurgy of ferrous and non-ferrous metals which are facing a structural change. The plans are to broaden the manufacture of the equipment for continuous pouring and vacuum degassing stations which will form a new produc mix at the Vitkovice concern. In the near future, the Skoda concern is expecting deliveries of metallurgical furnishing lines for sheet metals and strips, tied to the deliveries of rolling trains which process material into the final product for use in the food, automobile and electrical engineering industry. These will be mechanical production lines for lengthwise and crosswise cuts, lines for heat processing, lines for electrolytic metal plating and plastic coating production lines.

In order to maintain the rolling mill equipment export capability, we must focus in the future, on the development of individual systems and machines,

particularly on structural simplification, increasing the size of the blooms, reducing the specific consumption of material and energy (by the user), rational utilization of waste heat, tie-in of the rolling trains to continuous pouring and increasing the standards and the extent of automation.

Therefore the manufacturing branches under jurisdiction of the Federal Ministry of Metallurgy and Heavy Industry, such as machine tools, forming machines and rolling mill equipment have a good perspective with favorable marketing parameters. For the Eighth 5-Year Plan we have set demanding goals in the dynanic of the development, in order to better satisfy domestic needs and to increase our exports.

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